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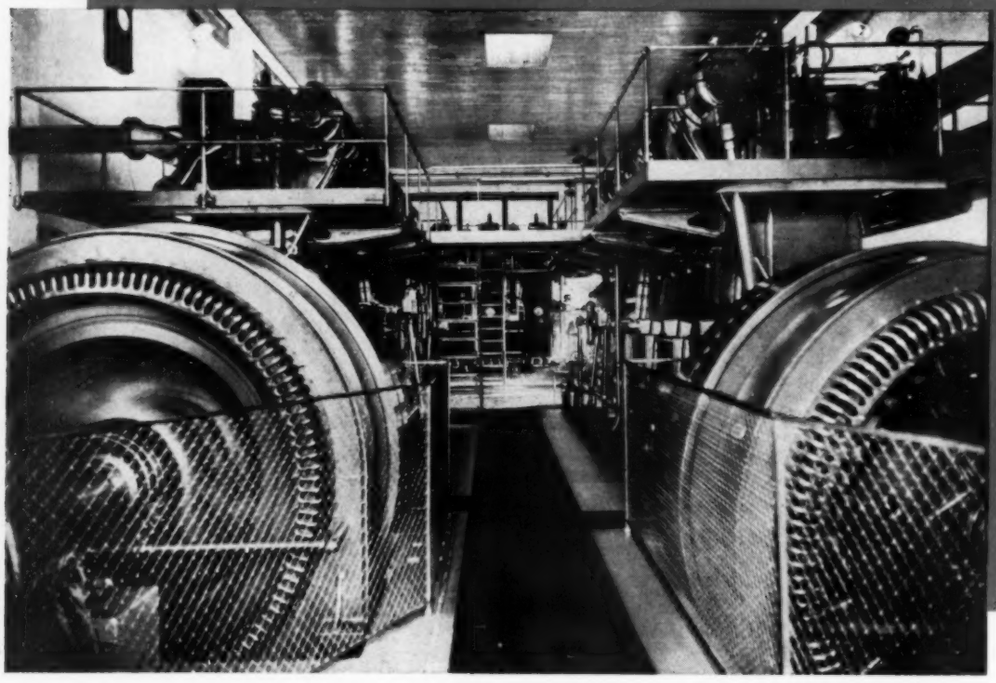

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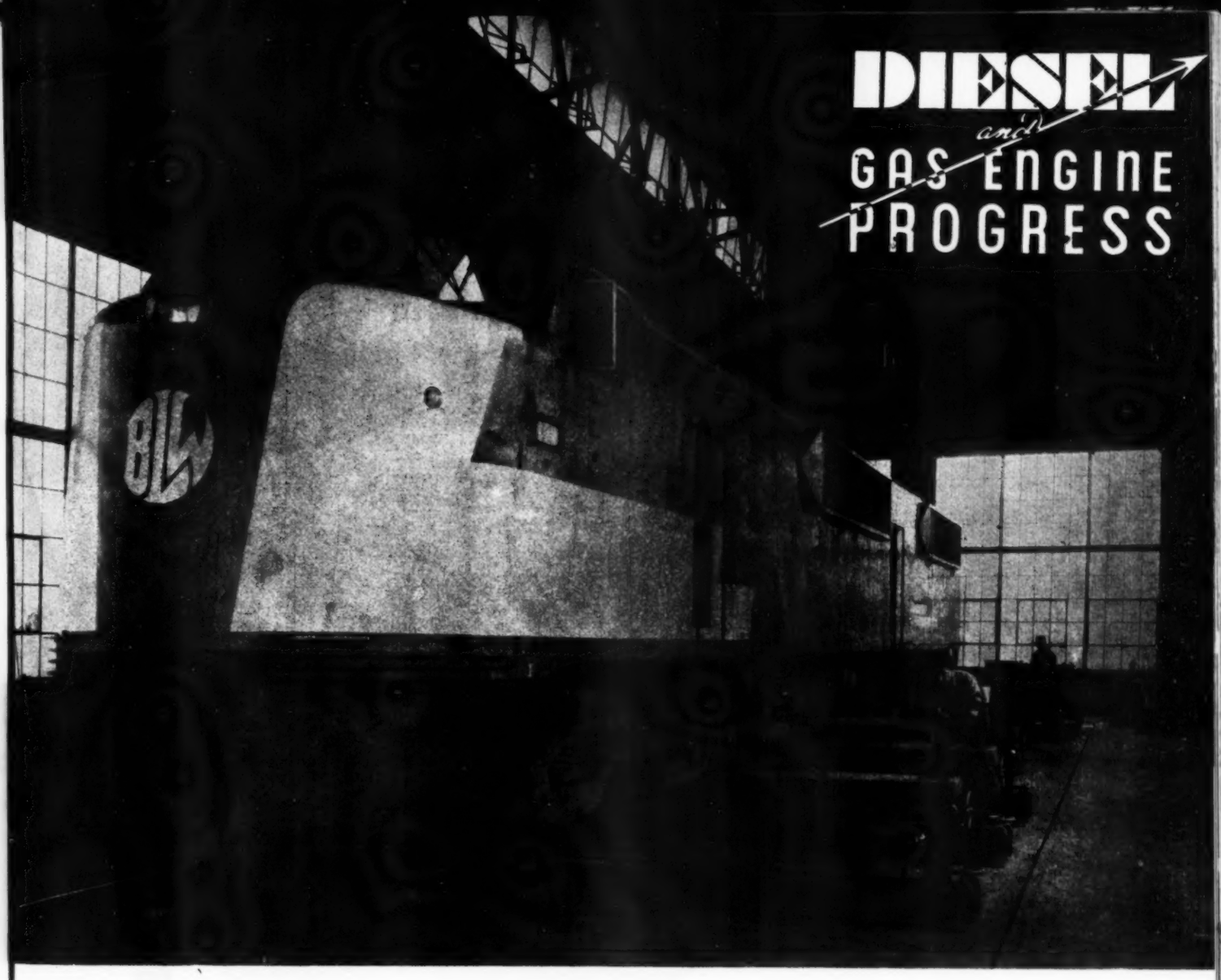

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Managing Editor

HEYWORTH CAMPBELL
Art Director

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FRONT COVER, DECEMBER 1945: We hope the Message, Peace On Earth, Good Will To All Men, may be echoed throughout our Industry—throughout all Industry, the Nation and the whole World. It dwells in the hearts of all men—and awaits only implementation.

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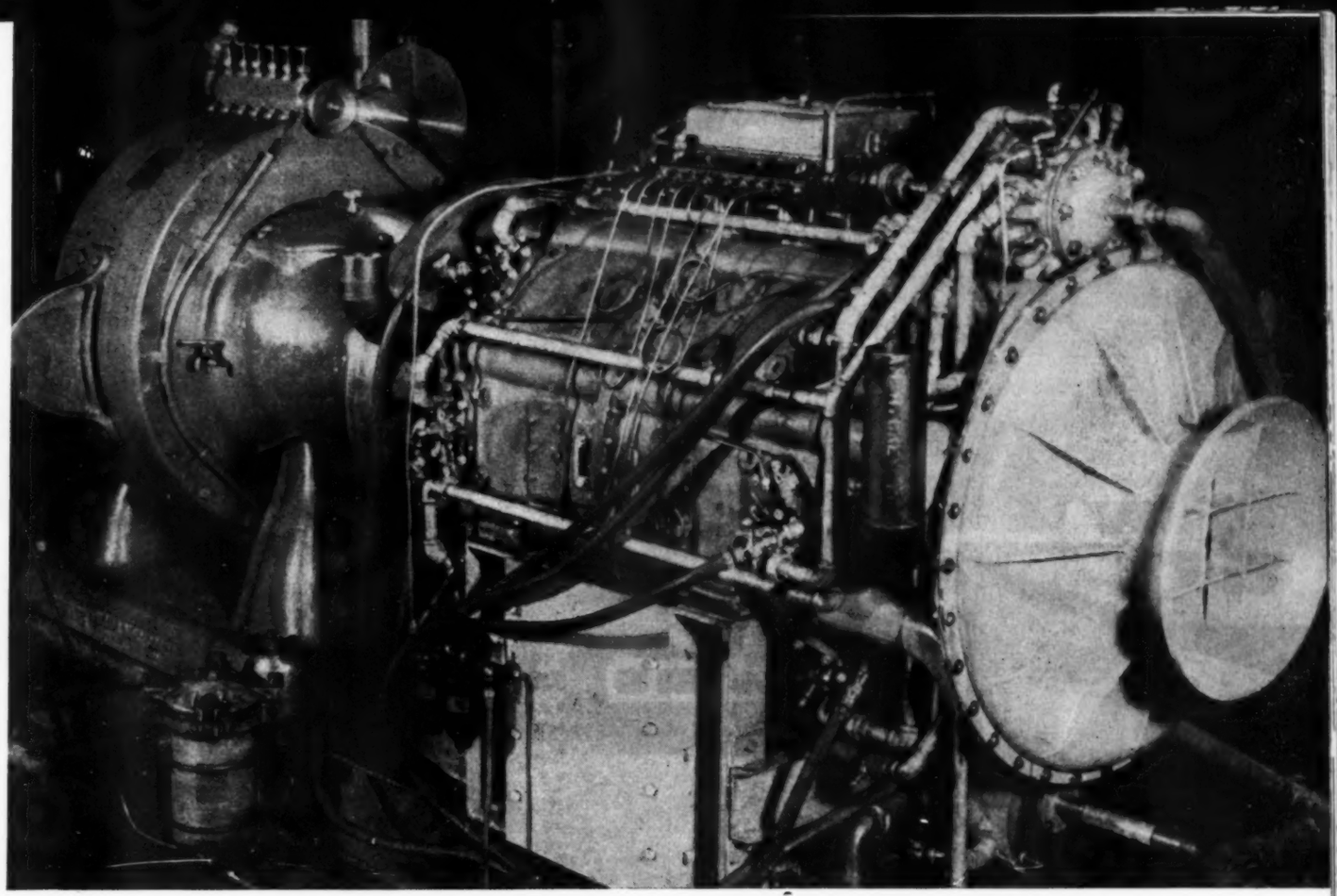


General view of the experimental model—an 8- (double-acting) cylinder, 2-cycle unit, designed for 1000 hp. output at 550 rpm. On top of the engine is seen the specially designed ADECO fuel injection pump; left, Taylor dynamometer; lower left, Nugent fuel filter, and on engine base, Purolator final fuel filter.

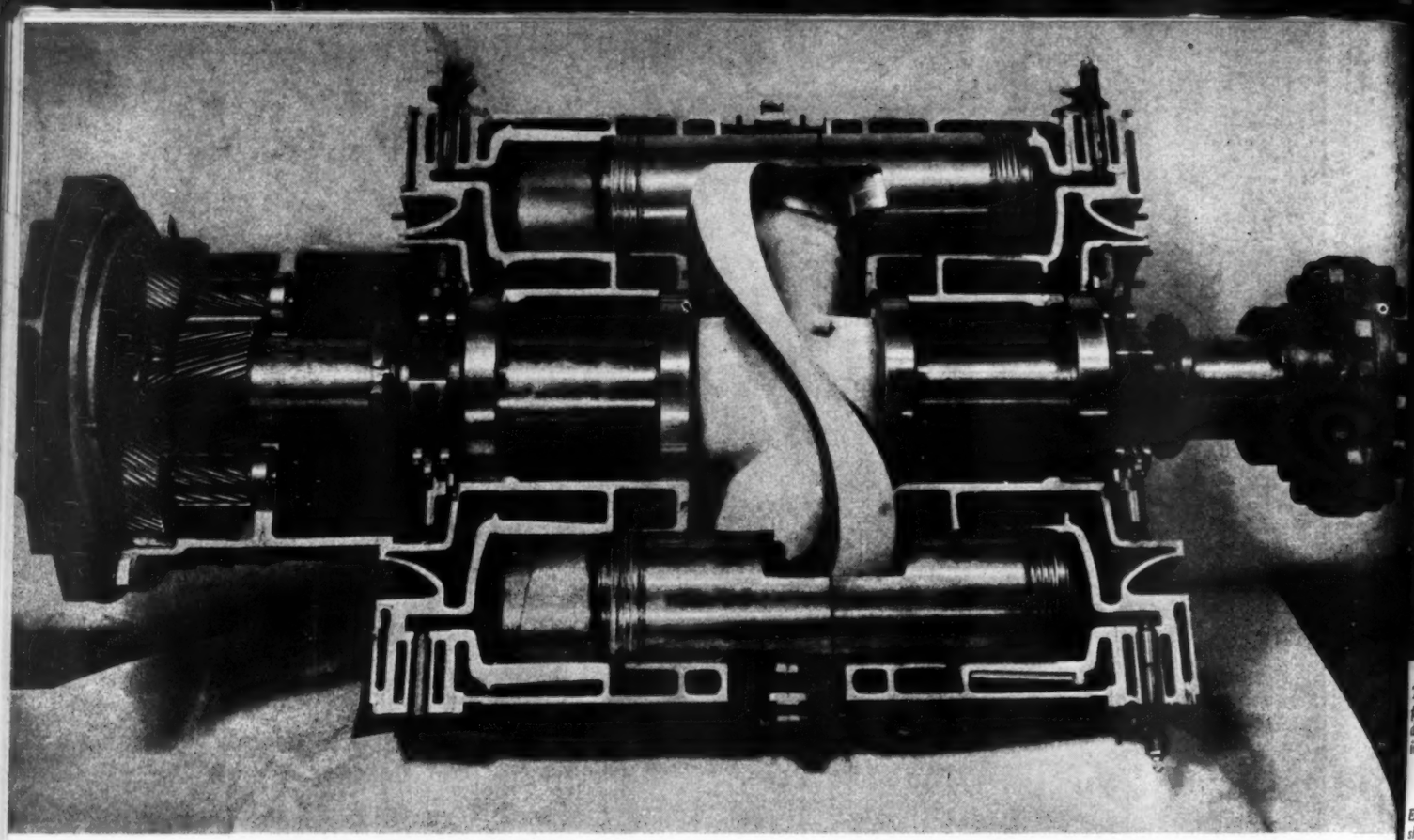
A NEW FLOATING-CAM DIESEL

By WILBUR W. YOUNG

THE barking of open exhaust stacks frequently breaking on the quiet atmosphere of peaceful Jacksonville, Illinois these days is nothing more nor less than the birth struggles of a new Diesel engine, or more properly—a new approach to a familiar idea in Diesel design. It is the experimental model of Charles N. Kahl's 2-cycle, uniflow 8- (double acting) cylinder, Floating-Cam Diesel, going through its paces. Many historical "Firsts" have transpired in Jacksonville, Illinois, not the least of which was operation of the first steam railroad train in the Mississippi Valley from that village in 1839. Time has witnessed great strides since that humble beginning—time will prove or disprove the merits of the new Kahl Diesel, the development of which has been sponsored by Lee Sullivan, president of Eli Bridge Company, the world's only manufacturer of Ferris Wheels.

Meantime there are many who will be interested in knowing the underlying principles of this new engine and in seeing graphic evidence of progress to date as shown in the accompanying illustrations. Picture an engine in which the inertia, combustion and compression forces are so balanced against the weight of the piston and the shape of the cam track that the rollers are held against the cam faces at all times. There is no crankshaft in the customarily accepted sense. The medium through which the reciprocating motion of the pistons is transformed into rotary motion is the so-called Floating Cam, embodying a series of elliptical convolutions with a ratio of major to minor axes of 1.1 to 1 which approximates parabolic action. By firing four cylinders simultaneously, in such an arrangement, all opposing forces are theoretically cancelled out, resulting in vibrationless operation. In other words, the engine requires no inertia mass in its base—only a support of sufficient strength to bear the engine's weight. And speaking of weight, the present experimental model, using eight, double-acting cast iron pistons, and designed for an output of 1000 hp. at 550 rpm., as constructed, figures 4 pounds per horsepower. The use of aluminum pistons would give identical stresses at 800 rpm. and 1500 hp. The inventor visualizes an aircraft engine of this type of 3000 hp. rating and weighing 0.7 pounds per hp. In the light of designed output it is interesting to note this engine's physical dimensions. The length of the block is 40 in.; diameter of block over flanges is 35⅛ in. The drive shaft measures 56⅞ in. long and the overall length of the engine from outside of supercharger case to coupling is 5 ft. 10 in. The cylinder bore is 6.39 in., stroke 6.75 in., and since there are eight double-acting pistons, it is in effect a sixteen cylinder engine.

In fact the allowable number of cylinders is a function of cylinder bore and most any number of cylinders in this arrangement may be visualized. Since the engine can operate in any posi-



Cutaway section showing, left to right: Scavenging blower; Falk 6.28:1 step-up gears; valve cam and followers, above which is seen a fuel injection nozzle, then the double-end piston and "Floating Cam." Note roller bearings on main shaft, gears, valve cam and main cam followers.

tion—that is, with the drive shaft at any angle from horizontal to 90° with the simple provision of a scavenging lube pump, and it requires no foundation mass—it is considered well adapted to applications requiring portability in ranges of 1000 hp. to 10,000 hp. on a single shaft. Units of higher rating cost less per hp.

It seems feasible with no added complications, to utilize exhaust for turbo-charging or power turbine drive through which the inventor visualizes efficiencies up to 55% with lower production costs per hp. output than either conventional Diesel or Gas Turbine.

Mr. Kahl speaks of the "Breathing" piston. In this he refers to the 2-part construction with the two halves bolted together but actually held apart by compression springs. This assures constant contact on both cam faces and renders the assembly self compensating for wear of both the cam and piston pin bearings. It is also noteworthy that valve timing is without gears and is therefore immune to wrong adjustment or faulty assembly.

The present engine is almost 100% anti-friction bearing equipped, the only exception being the sliding valve tappet guides. Lubrication of the inside of the engine is therefore easily and effectively accomplished with eight high-pressure jets impinging on each side of the web of the cam. Centrifugal action of the cam throws the oil outward into and onto the pistons thus lubricating and cooling the pistons.

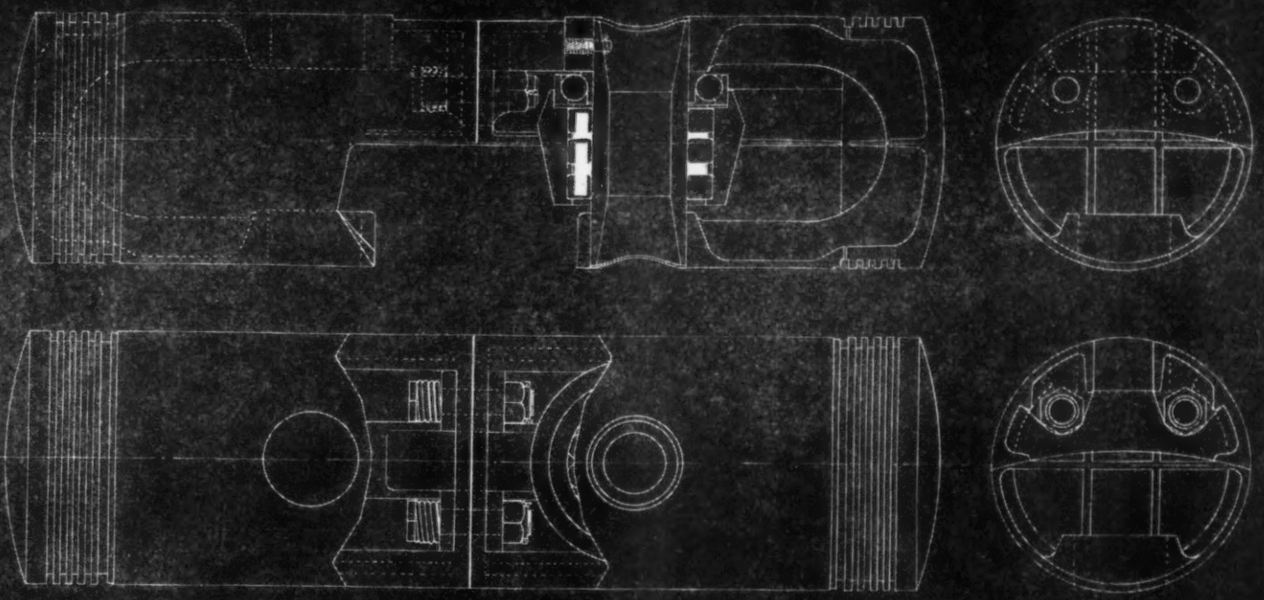
Scavenging air is led from the blower through eight longitudinal pipes which are interconnected through annular channels which belt the scavenging ports giving uniformly continuous flow to all cylinders. The scavenging blower is driven off the end of the drive shaft through Falk step-up gears having a ratio of 6.28 to 1.

Charles N. Kahl, consulting engineer for Eli Bridge Company, started designing this engine in June, 1940 and the first contracts were placed in November, 1941. The ensuing period was hardly optimum for getting outside work done, but piece-by-piece and with time out for regular duties as well as consultation assignments for the U. S. Army Ordnance and Air Corps, Mr. Kahl, with Mr. Sullivan's enthusiastic help, has managed to put a workable engine together. They feel that although there are still some "bugs" in the machine, they have now eliminated the "dragons" and are on a fair way to accomplishing designed performance.

Among the accessory parts and assemblies, secured from outside sources, some of which involved special and costly design and manufacture are various types of antifriction bearings; ADECO fuel injection pumps and nozzles; Brown & Sharpe fuel and lube pumps; Nugent initial fuel filter; Purolator lube and final fuel filters; Thompson exhaust valves, inserts and guides; and McQuay-Norris piston rings. The two top rings are Van der Horst Process Porous Krome-plated. The present experimental model is running on Texaco "303" lube.

It is hardly feasible to prognosticate the future of this engine, neither would further description greatly clarify the functioning of its component parts. The idea is not new but it appears that in his cam and piston designs, Mr. Kahl has achieved considerable workability in these erstwhile troublesome elements. Furthermore the permissible and extensive use of anti-friction bearings is a long step toward refinement and economy.

Had this presentation been made for popular consumption it would have been opened with the inventor's own characterization of his engine, which though facetious, really paraphrases the foregoing. Mr. Kahl says: "Here is an engine without a crankshaft—its camshaft has a bulge on the crankshaft and the flywheel has a wrinkle in it. The pistons breathe and the engine is balanced both structurally and functionally—it requires no foundation."



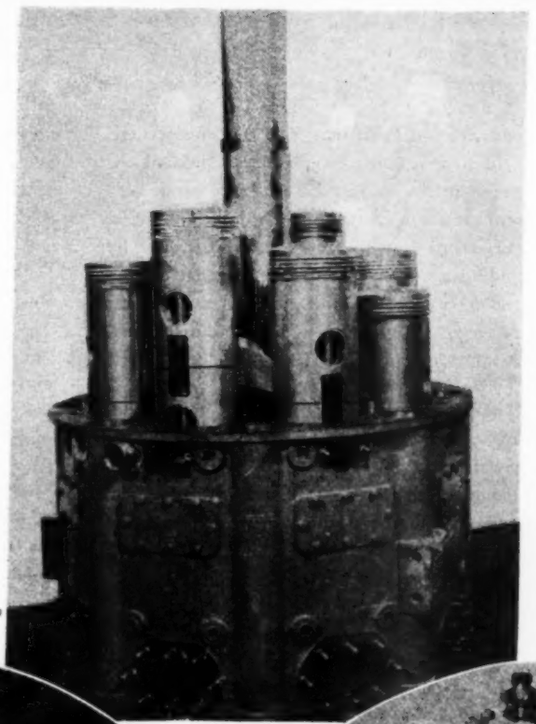
The double-acting piston is a two-part assembly, bolted together under spring tension, with roller bearing cam followers.

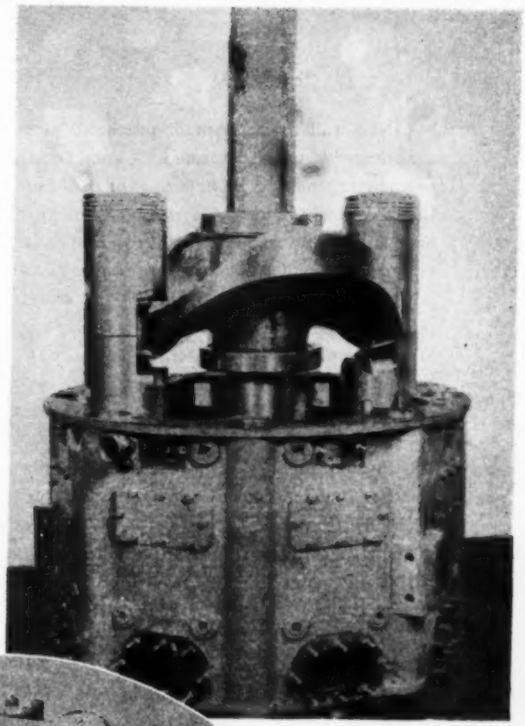
Extreme right: Partial assembly showing two pistons and "Floating Cam" in place.

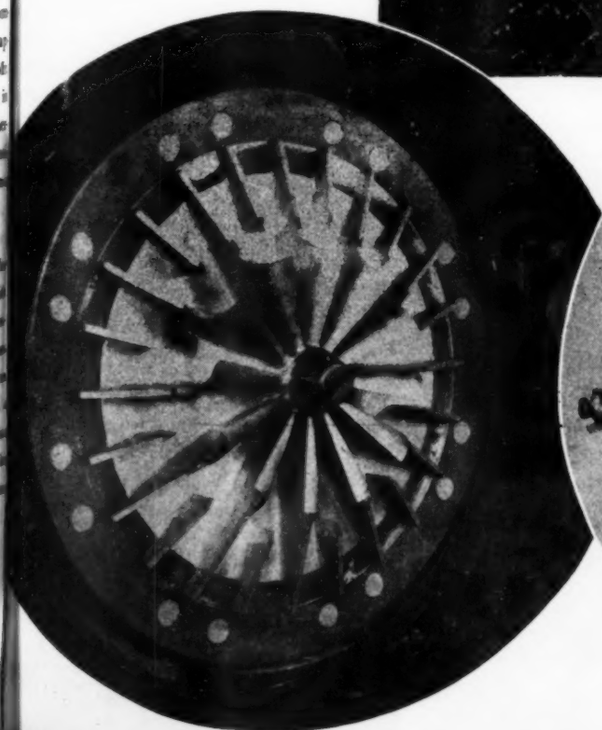
Center: Piston and cam assembly complete ready to receive the other half of the cylinder block.

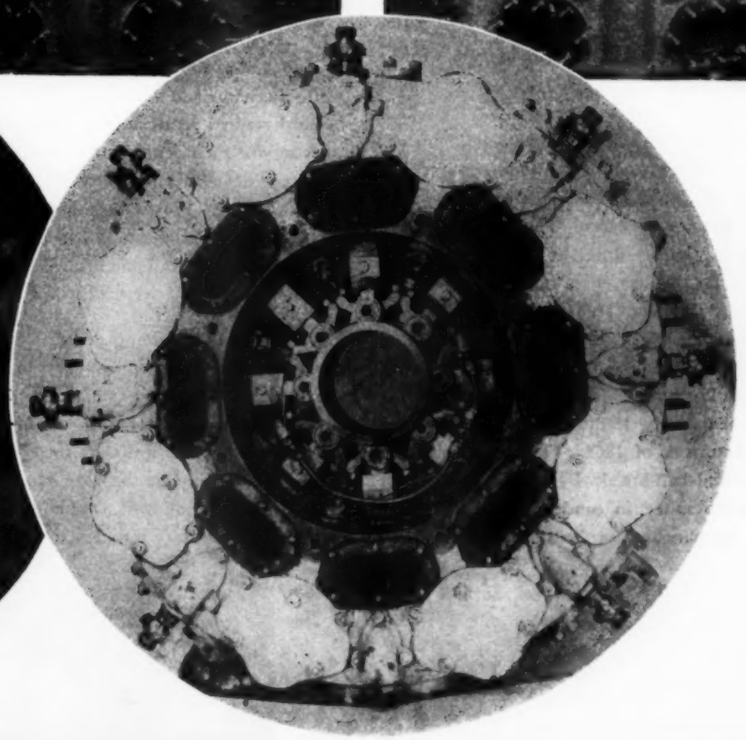
Lower right: End view of cylinder block showing the valve operating mechanism. Note, each cylinder is provided with a pair of exhaust valves—intake is through cylinder porting.

Below: The scavenging blower is cast Dow metal from pattern made by the inventor of the engine.



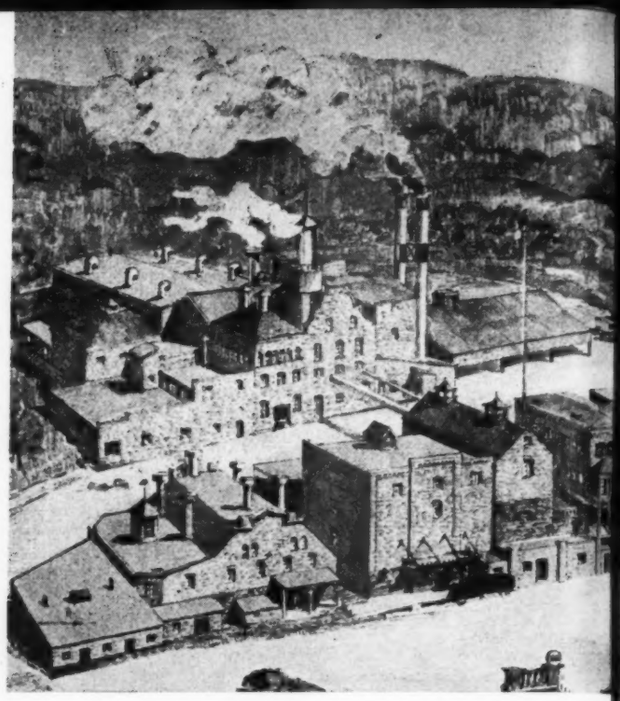






DIESELS SLASH POWER COST FOR BREWERY

By T. J. MALONE



A brewery has occupied this site at Mankato, Minnesota, since the early 1860's.

SINCE full replacement of purchased electric energy by generation from self-owned Diesel engine equipment in 1938, savings of the Mankato Brewing Company, Mankato, Minnesota, have amounted to about two-thirds of what its power cost would have been on the purchased power rate. Savings from the use of Diesel power beginning with installation of the first Diesel engine in 1933 enabled the company to pay in full the investment in its three Diesels and their auxiliary equipment.

The second engine was installed in 1934, the third and latest in 1938. All engines were supplied by Fairbanks, Morse & Co. When the plant put in the third engine, it discontinued all use of energy from the utility. In the year before, the average charge for purchased energy had been 1.5 cents a kilowatt hour. In the years since, the average cost to produce energy by its Diesel setup has been about half a cent a kilowatt hour.

The plant of the Mankato Brewing Company occupies five acres of high, wooded ground at the edge of the city, which is near the elbow of the Minnesota River. There has been a brewery on the site since the early 1860's.

Mankato, of about 18,000 population, holds the distinction of having once been center of the painstaking and compassionate attention of Abraham Lincoln. This was in connection with punishment of the leading actors (bad) in the Sioux Outbreak of 1862. Trial of nearly 400 Indians and half-breeds, by a military commission, had resulted in condemnation of 303 to death by hanging—for murder, outrage and participation in battles. The condemned were held in a prison camp just outside Mankato. Presidential approval was necessary before sentence could be carried out. Mr. Lincoln ordered the record sent him in Washington, where he and advisers went over it carefully. He cut the list down to thirty-nine. One man was later reprieved. The remaining 38 were duly hanged, in Mankato, in one day.

The brewery plant of today comprises ten buildings, running through brew house, wash house, cellars, pitch and bottle houses, to garage, maintenance shop and warehouse. It consumes yearly about 85,00 bushels of barley malt and much corn, and produces around 90,000 barrels of beer. The range of barrel sizes includes, full, halves, quarters and eighths; cases are of pint- and quart-size bottles.

On taking over in 1933, the present owner installed a 55 hp., single-cylinder, Diesel engine, with alternator and auxiliaries. This was a step toward gradual replacement of the private utility's service by a generating system of its own. The engine added the next year was a two-cylinder of 120 hp. With the third engine, a three-cylinder of 180 hp., the generating units had a combined horsepower of 355 and a total rated kilowatt capacity of 223.5.

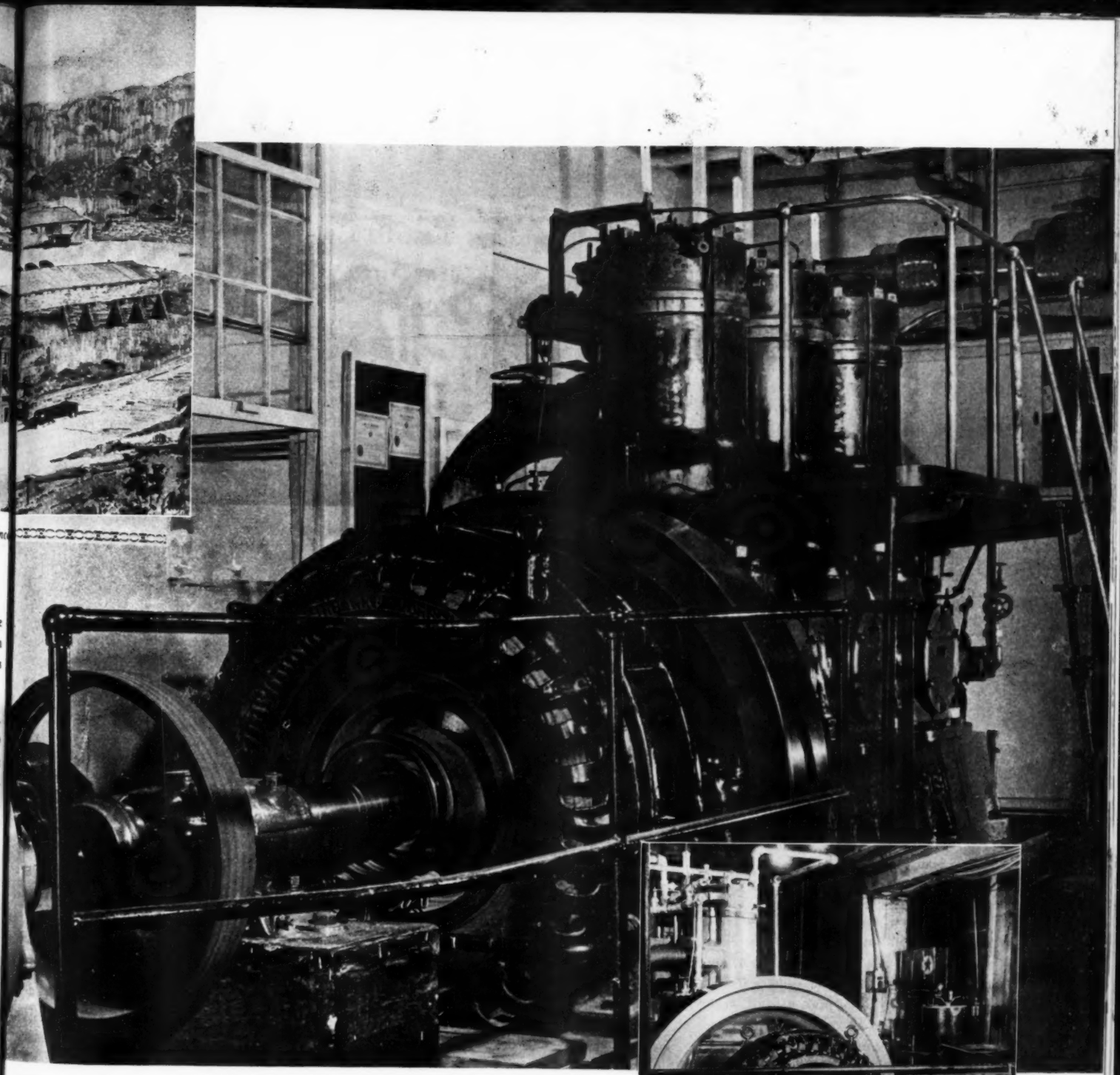
The peak load has been running about 100 kilowatts. Any two units together can serve the peak, though the two smaller ones do it without much margin. For most of the time, the 55 hp. and 180 hp. units are used, running 24 hours a day through the year except on Sundays and some holidays. On those days operation is reduced to around sixteen hours and the 120 hp. unit is cut in to give one of the others a rest and maybe a looking over. Division of kilowatt capacity among the three units is 33.5—72—118.

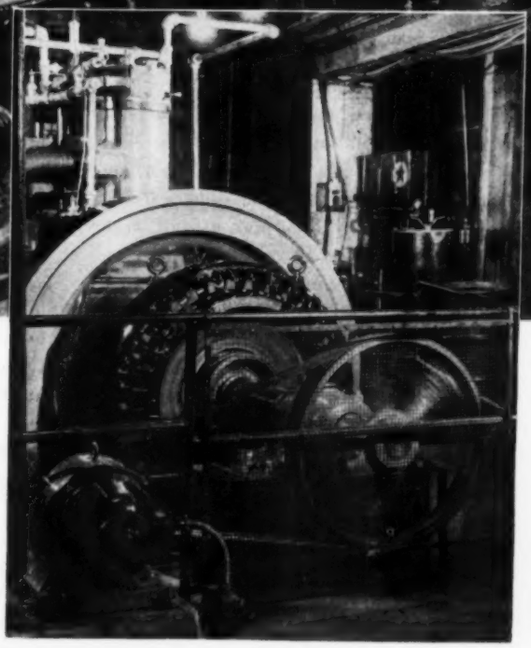
With almost continuous operation of the one- and three-cylinder units, how do they hold up? All engines get a careful going over at least twice a year. Cylinder walls are inspected, pistons, rings, pin bearings, with repairs and replacements if called for. The engines stand the gaff.

Electric power through 45 motors operates most of the various steps in the manufacturing process from malt to beverage. These motors, of a combined 240 hp., drive conveyors—belt, chain-belt, roller—elevators, agitators, pumps, air compressors, washers, labeler.

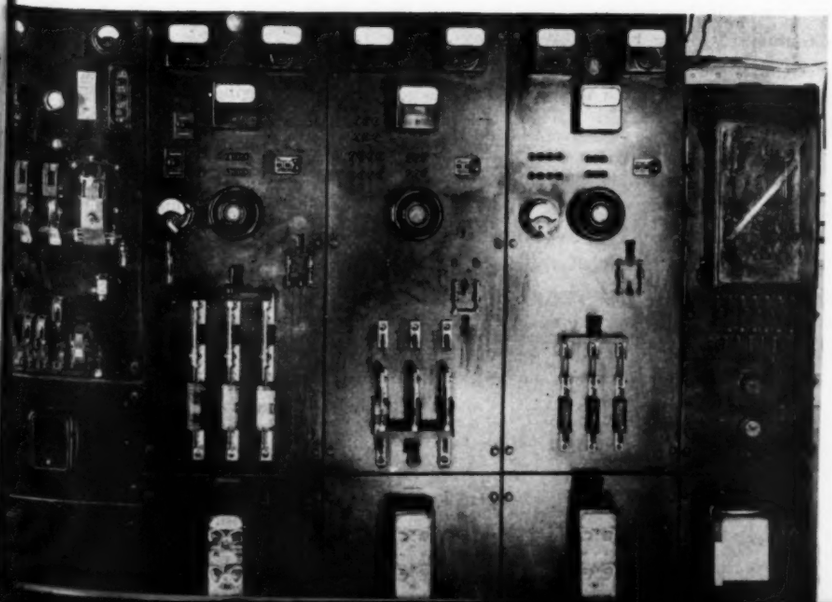
Then there are the tanks, about 100 in all—fermenting tanks, storage tanks, carbonating tanks. Of a total of about 12,500 barrel storage capacity, the cellars can take 7,500 barrels. Some of the cellars have been excavated back into the limestone hill.

Along with the advantages of paying less for power and of owning the generating equipment, the Mankato Brewing Company finds an outstanding value in not being dependent upon an outside source for its operation. "We have security, and security is important in our program," says Dan R. Bruzek, general manager of the company. "The fact that we are protected against shutoffs due to storms or accidents makes for a better, uninterrupted schedule of production which is of special value."





Latest of three power units is the 3-cylinder 180 hp. F-M Diesel seen in the top view. Above is the first unit installed, a single cylinder, 55 hp. F-M Diesel.



The Electric Machinery switchboard carries Weston meters and Alnor pyrometers.

Twenty-two General Motors Diesel trucks (count 'em), 21 of which are logging trucks with extensions rolled up piggy-back. The unit seen, extreme right, is used for sprinkling roads.

BLUE OX WITH DIESEL HEART

By F. HAL HIGGINS

THE best war weapons of 1945 were (and are) also our best peace weapons. The Red River Lumber Company with headquarters at Westwood, Calif., 240 miles northeast of San Francisco, cradled—no, crucibled—the war-winning tractor that has been praised to the skies as our "secret weapon" of World War II. True, the Big Town war correspondents, radio commentators, camera news men, and even generals, have called it a "Bulldozer" and let the tractor remain unknown. But a couple of million loggers, farmers and contractors and their workers know that mouth-filling word is only correctly used in referring to the blade attached to the nose of this tough crawler tractor that got its education and fighting ability in the woods.

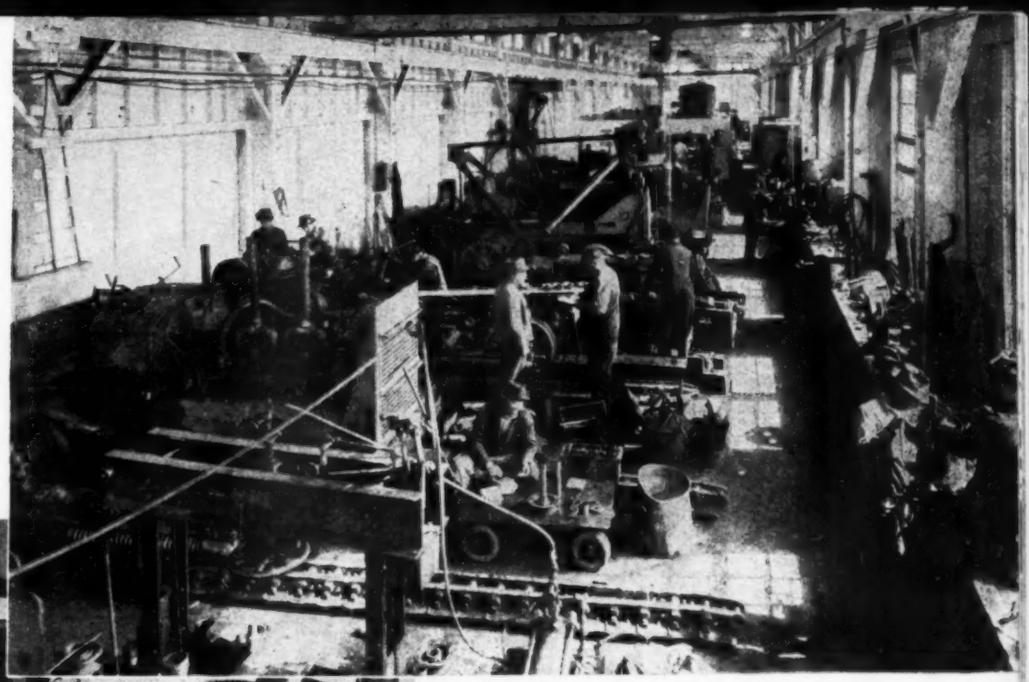
To get down to the famous Walker family and its better-known Red River Lumber Co. with its three generations of loggers from Minnesota to the Coast, your Old Reporter took a special trip up to Westwood recently to see what kind of a "show" the old Red River outfit had turned over to the Fruit Growers Supply Co. when it sold out last fall. Reason, he knew that Red River had pioneered Diesels in the woods and laid down the fundamentals that now govern mechanized logging throughout the West with those ideas sweeping the world wherever modern logging is done. However, the writer must admit a high admiration for the kind of men found in Western logging from executives to high-climbers. They represent a rugged pioneering breed of men who built this nation. It's good to get out in the woods and see and watch them work. It restores one's faith in men and country. "Go see Fletcher Walker, the last surviving member of his generation of his clan in the Red River set-up at Westwood," they said.

So, after interviewing "Billy" Laughead, advertising specialist, author of Red River Paul Bunyan stories and artist for the old Red River Company, your OR located Mr. Walker senior in the main office. He found him cordial and willing to reminisce on his favorite topic—mechanized logging. He knows his subject as no other man we have encountered in some 18 years of occasional contact with men in the logging and equipment industries.

"The first improvement we made here in the tractors when they started logging was to cut a hole in the tracks—one in each shoe—to let the snow out," began Mr. Walker. "We broke up a lot of tracks learning that the snow had to get out. We had to build fires to melt the ice and snow from under the tracks as they forced the tooth to punch into the track. Now all logging tracks are made that way, of course.

"Well, we made 150 changes on the tractors to get them to the logging efficiency we wanted. Look at this chart on my desk top and you see I have written in some 40 of them on the skeleton outline of the old Cat gas Sixty. I can recall enough more to add up to 55 for the record.

"In our Tractor House, or shop, we are beginning to standardize our Diesels. Those 2-cycle General Motors Diesel trucks we bought in 1940 are proving out. We like the idea of the



View of tractor repair line in the Fruit Growers Supply Tractor House, showing Allis-Chalmers and Caterpillar tractors.

Shop foreman Walt Foster and Mel Bronson (with wrench) repairing GM Diesel at Tractor House, Westwood.

same Diesel engine in trucks and tractors, and the General Motors 2-cycle Diesels in Allis-Chalmers HD14s and the 671 Diesel trucks are the same. It simplifies shop work and the purchase and stocking of parts. The Diesels we have today are three times as efficient as the first ones we had back at the start of Diesel tractors in 1934-6. The engines are so far ahead of the rest of the machines that power must wait while clutches, brakes, etc., catch up.

"Drivers make a lot of difference, experienced ones being worth much more than green drivers when you look at the service records on tractors, trucks, or other pieces of power equipment."

Fruit Growers Supply Co. Diesel engines today are:

Tractors:

Allis-Chalmers ..	9	HD14s
	12	LLOs (Hesselman and A-C improvements)
Caterpillars	20	D8s
	2	D7s
	2	D4s
	4	50s
	2	Autopatrols
Motor Trucks:	21	GM Logging 671s
	1	GM Water Wagon, 671
Log Loaders:	2	Osgood, GMC 671s
Camp Light:	1	GMC 671
	2	GMC PD40s
Log Pusher:	1	GMC 671

"The key to the Diesel is high compression," continued Mr. Walker. "We went to high compression before the Diesel tractor was offered the customer as a unit. We took some of the Caterpillar gas Sixty chasses and bought Atlas Diesel engines to set into them and start the Diesel logging back in the 1920's. The engines were too heavy for the old Sixty chasses, of course. Tracks were another weakness on the early tractors. We built our own foundry to make our own manganese tracks to replace the cast steel tracks furnished as standard. As a matter of fact, we had to rebuild the tractors here in our own shops to get them ready for logging. But not until tractor logging came along could the logging arch succeed, though it had been tried out several times in crude form. Now Hyster, Ateco and others have them standardized and sturdy enough to do the job.

"I don't know how this war could have been won without the modern tractor with its bulldozer and winch as developed in the western woods starting here on the Red River operations. The big thing was they were ready when the critical time came because they had been up against the logging problems and had been changed and strengthened until they had whipped those tough problems.

"Red River goes back to 1875 in logging in Minnesota where we started. I can't say that these mechanization ideas have cut cost of logging. Labor cost has gone up as fast or faster than cost-cutting. The fellow who didn't mechanize just had to drop out of logging. We used to have 800 men, half of them swamping the timber so the horse could get through. One man on a Diesel Cat-pushed bulldozer can do that job now. We had 350 horses, many costing $500 each. The modern Diesel tractor gets three times the logs as did the old gas tractors."

Shop Foreman Walt Foster showed your OR around his Tractor House where a crew of 30

Allis-Chalmers, G.M. Diesel tractors hauling logs up to loading point.

men service the tractors and trucks that come in for major overhauls. Another 12 men work out in the woods on the edge of the logging operations to handle emergency service. We have standardized on two makes of Diesel equipment. We don't have so many different kinds of Diesels as you saw back in 1936 when you visited Red River's operations. 8 different kinds were then found in various jobs from railroad locomotive to camp light and power plant."

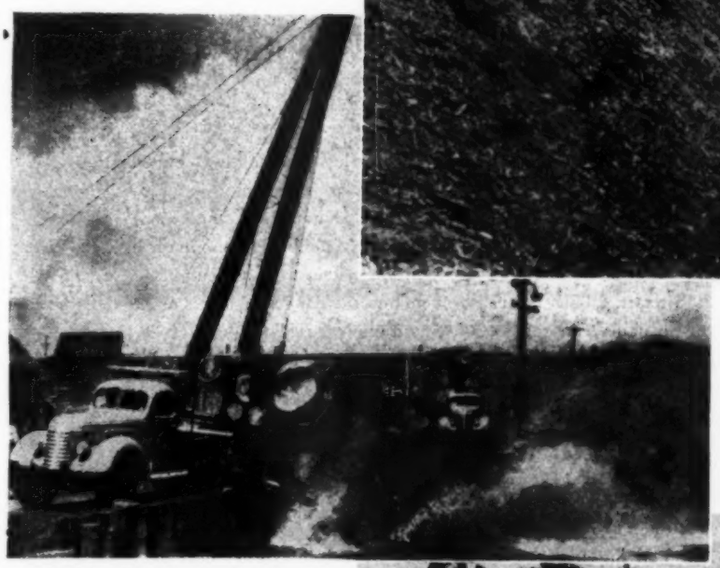
The Walkers and their Red River Lumber Company was for 20 years a headache to all manufacturers and their sales representatives who visited their operations and tried to "sell their lines." From several salesmen, engineers and officials of tractor, truck and engine manufacturers the writer has had first hand the reactions of these men. Those who knew logging and understood the tough problems confronting loggers usually were smart enough to sell their bosses back at the factory on the stake they were shooting at over the long pull and the necessity of working with Red River in constructing a piece of equipment that would stand up and deliver logs under conditions of mile-high altitude, snow, mud and dust. Probably it is no exaggeration to state that the Red River loggers taught manufacturers who worked with them more sound fundamentals on building something to do the job and on restraining their salesmen from overselling it than did any other influence. Looking at the various equipment that went to war to revolutionize land and marine warfare over the past five years and we must admit that those Red River standards of performance demanded of tractors, Diesel engines, power shovels and draglines, paid giant dividends in "getting thar fustest with the mostest," which is generally recognized as the man-on-the-street language for delivering the knockout in wars.

The writer recently happened to run across "Bob" Anderson, now a highly successful manufacturer, mining engineer and capitalist, but a Best salesman in the San Leandro office at the time Red River began fitting tractors into logging operations. "Yes, I remember well that winter. I put on snow shoes and lived up at Westwood for months one winter back in the early 1920's," said Bob. "I had the job of first selling the Walkers on the idea that tractors could be used in logging to replace horses. "Finally, when I returned to the Best factory with the first order, the officials were skeptical. 'How will Red River ever pay for all these tractors?' asked President R. C. Force. 'Why should we make them up a lot of special tractors instead of selling them what we have built?' he continued. Mr. Force was a merchandiser and couldn't see the idea of building something special for one sale. C. L. Best, however, got me to one side and told me to keep quiet and not make an issue of the demands of Red River for some extras, and he would get them through for me. I was drawing $250 a month, by the way. Tommy Robinson was a service man in the factory then and immediately saw the big field this would open up and asked for and got the logging territory of northern California. Nevada and southern Oregon was also added. Well, Tommy soon had to get a plane to cover his territory, as orders for Cat Sixtys with all the extras poured in to make him just about a millionaire."

Gail Spain, a Cow College boy just out of Oregon State, started with Willamette Hyster at Portland. He is now a vice-president of Caterpillar. He recalls those bruising days for

Caterpillar Diesel tractor clearing snow for winter logging.

Bulldozing a mountain of sawdust out of the way with Allis-Chalmers, G.M. Diesel tractor.



A pair of G.M. Diesel trucks delivering huge loads of logs to mill pond.

Keeping dust down on logging roads with G.M. Diesel tank truck.

salesmen who contacted Red River's officials in trying to get their products into the woods. Says Gail in reminiscing about the ghostly past of 20 years ago:

"When Fletcher Walker was making all those changes on our gasoline tractors, I was one of the many peddlers that used to leave Westwood somewhat discouraged. Nobody ever built anything that was quite suitable for their uses.

You may recall that in those days they had their own winches manufactured, and for several years manufactured their own logging arches, which nobody in the world would have been able to use but themselves.

"In spite of all this, I still have a deep respect for Fletcher Walker and there is no question but what he and his people made a great contribution towards the development of present day tractors. All of us took a lot of body blows and insults, however, in the process.

"Thanks for being so thoughtful as to write me about your visit which recalls vivid and interesting history of the time when I was learning to trade iron for money."

NEW AIRCRAFT-DIESEL FROM CALIFORNIA

By L. M. BARTON

Three place airplane can now fly at higher speed and greater safety at one-third the cost of driving the family car.

THE re-birth of civilian aviation took place in Southern California recently when Donald Shaffer and Fred A. Thaheld announced that a new light-weight aircraft Diesel engine, designed by Thaheld specifically for the low priced airplane, had completed its final tests at the Shaffer Tool Works at Brea, California, and is now ready for actual production.

The new aircraft Diesel is designed to fly the average two or three-place airplane at a speed of 130 miles per hour and consume only three gallons of Diesel fuel at a fuel cost of not to exceed 21c if Diesel fuel costs .07c per gallon. And today the commercial trucking industry buys Diesel fuel at highway service stations for as little as .05½c per gallon.

The engine is being built in two horsepowers at present—100 and 125, with all parts of both engines completely interchangeable. Both engines are of the four cylinder type, opposed and are air-cooled with neither engine weighing over 235 pounds, or more than the conventional gasoline aircraft engine, some weighing as much as 325 pounds, now being used by manufacturers of light aircraft. This means that the maker of light airplanes can replace the present gasoline engine with the new Diesel engine without making any alteration in plane design or construction in their current production of 1946 models.

One prominent and successful producer of a light airplane has already estimated his production requirements at 10,000 engines for his 1946 building schedule, based upon a postwar sales program established long before the Thaheld engine had completed its final tests.

The bore and stroke of this new aircraft Diesel are 4⅞ in. and 5⅞ in., developing 100 hp. at 2,400 rpm. and 125 hp. at 2,600 rpm., with a piston displacement of 290 cubic inches, a compression ratio of 16 to 1, and a fuel consumption of .36 pounds per brake horsepower per hour. At a fuel cost of .09c per gallon the new Diesel engine will operate on a fuel cost of two tenths of a cent per mile. Fuel injection equipment is specially designed American-Bosch.

Fred A. Thaheld

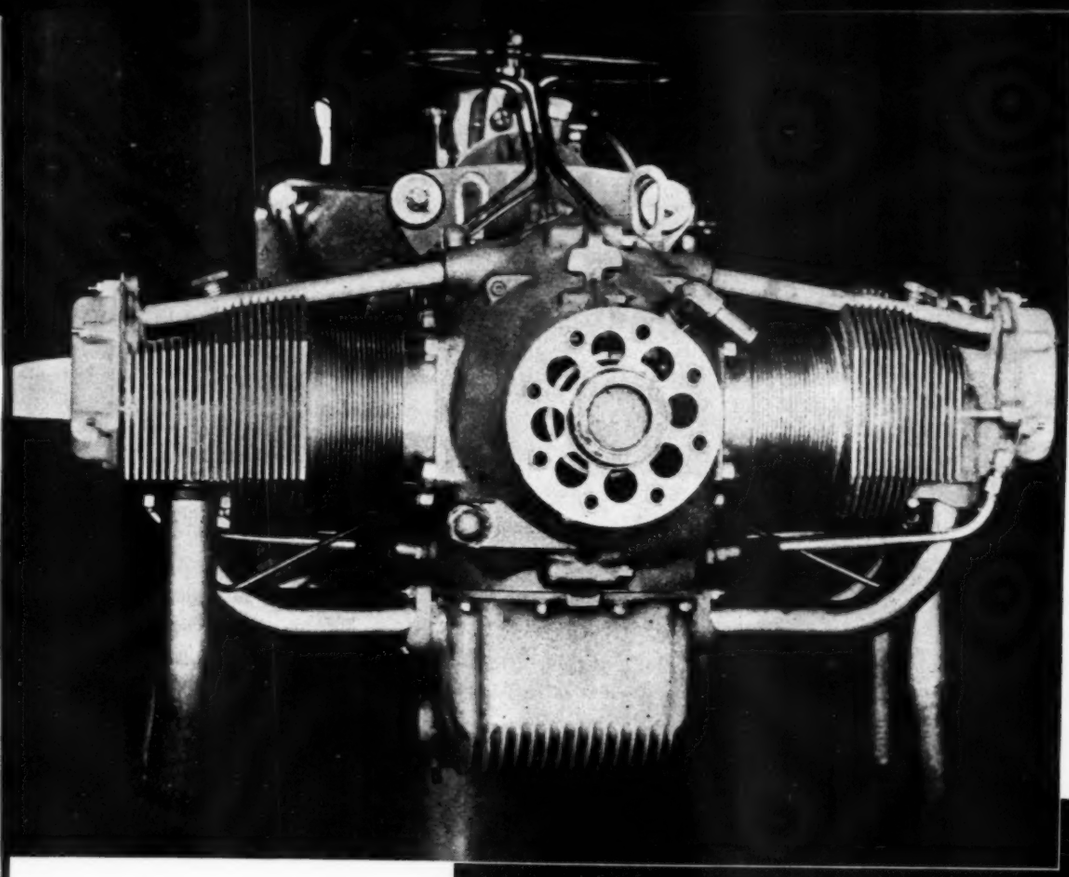
Donald U. Shaffer

But the advantages of the Diesel aircraft engine are far beyond its low operating costs. Diesel fuel is far less hazardous to handle and use than gasoline, for it does not contain the fire and explosive characteristics and risks of aviation gasoline, it completely eliminates the electrical ignition system with its complicated wiring system and the danger of sparks accidentally igniting fumes caused by leaky fuel line connections, as well as completely eliminating the hazards, so common to aircraft gasoline engines, of the icing of carburetors. The secret of factors of safety and economy lie in the fact that Diesel fuel is ignited solely by the extreme heat of its compression and vaporization in the combustion chamber, a principle most successfully used by manufacturers of Diesel automotive, stationary and marine engines for more than 50 years.

These Diesel aircraft engines will be welcomed by the aviation industry for the foregoing reasons as well as the fact that they do not lose horsepower at high altitudes in anything like the same proportions as do gasoline engines. It is a soundly established fact that any airplane in which a Diesel engine replaces gasoline power, the ceiling is automatically increased at least 40%. It is commonly known, and taken into consideration by makers of all types of aircraft, that the higher a gasoline powered airplane is flown, the more power it loses because of the lightness of the air which increases with the higher altitudes. This is why "ceilings" are the most significant item in the specifications of an airplane.

Through its ability to automatically raise the ceiling of any airplane it is expected that the ultimate development of aircraft Diesel engines will extend to the largest commercial planes of the future, and plans in this direction are already far advanced, with the next development of the Thaheld Diesel being a six cylinder, opposed, air-cooled engine with all of its parts completely interchangeable with the four cylinder models with the exception of the crankshaft, crank case, cam shaft and fuel pump. The interchangeability of parts is the secret of not only mass production, but lower cost production as well.

The Thaheld Diesel is to be produced by Diesel Power, Inc., a division of the Shaffer Tool Works at Brea, California, until added production facilities are established adjacent to one of Southern California's important airports.



Left: Front view of the Thaheld-Shaffer 4-cylinder, opposed, air cooled Diesel. Displacement is 290 cu. in., sea level ratings, 100 hp. at 2400 rpm. and 125 hp. at 2600 rpm. Below: Fred A. Thaheld, designer and flyer, with the new Thaheld-Shaffer aircraft Diesel with propeller in place.

Thaheld's name is not new in aviation. Twenty-one years ago, back in 1924, Thaheld built the first low-wing monoplane ever built in the United States, together with a three cylinder gasoline engine of his own construction. Leaders in the aviation industry who inspected the Thaheld low-wing monoplane declared that it was a fantastic idea—that no one would venture to build a low-wing monoplane, much less try to fly one. But the Thaheld plane did fly and today America's most successful private and commercial airplanes, as well as the giant war bombers, are low-wing monoplanes. Thaheld was right.

It was four years later, in 1929, that Thaheld went to Texas to carry out his original ideas for building a nine cylinder, radial, Diesel aircraft engine, which became the first Diesel engine ever licensed for aircraft use by the Civil Aeronautics Authority. It is noteworthy that Thaheld's financial supporters rejected a substantial offer for the engine's patents, when not more than $100,000 had been invested in its development.

It is a coincidence that Thaheld's new Diesel engine has been developed on practically the same spot where, 21 years ago, his low-wing monoplane established a design which has since been followed by the manufacturers of the most successful airplanes.

DIESEL CRUISER "SUNBEAM"

By DWIGHT ROBISON

THIS is the story of a boat with a mission and the story of a mission with a boat.

Along the 2500-mile rock-ribbed Maine coastline, this is a saga of the war that will long be remembered by the thousands of isolated people who have been served by the Maine Sea Coast Missionary Society and—the *Sunbeam*.

The *Sunbeam*, at first glance, might be—well, just another good boat. But to thousands, this staunch, 72-foot Diesel cruiser has been an angel of mercy coming out of the night to take those near death to doctors, to bring food to those near starvation and to haul the mail when there just wasn't any other means.

It was way back in 1905 that the Mission started with one man in a Friendship sloop called the *Hope*. But it was not until January of 1940, when *Sunbeam III*, built at a cost of nearly $40,000 was launched, that the greatest of all mission boat tasks got under way.

From ice-breaking to gale-running, this doughty little giant, with its powerful, Superior main Diesel has kept pounding away without a let-up or breakdown and now with war over, has undergone overhauling and is throbbing forward on a new mission—a mission of peace. The ensuing story pays silent tribute to the never-failing main Diesel which, let it be known right here, was constantly lubricated with MacMillan ring-free motor oil.

Despite the extremely heavy demands on the boat for emergency service to civilians—taking the ailing to doctors, carrying the deceased to burial spots, transporting mail and groceries and medicines to desperate island folk—it found time to assist the nation in war, breaking its way into ice-locked harbors and rivers to bring out newly-launched naval craft which were sorely needed and which otherwise would have been unavailable to the government until spring came to melt the ice.

When distress overtakes individuals or communities, the shrill whistle of the *Sunbeam* over wintry waves comes like the cheerful voice of help. On a single cruise, it may be: a freight boat, passenger cruiser, hospital or funeral ship.

For instance: It is the middle of January. From the missionary pastor stationed at Swans Island comes the message:

"The harbor is filled with ice. We haven't had provisions or mail for several days."

The skipper, Capt. Ralph J. Frye, was ill, but nevertheless, at 8 o'clock next morning the *Sunbeam* took off on its errand of mercy, described in the following words:

"When once we reached the island, outgoing mail and passengers were quickly aboard and again we were on our way. The ice blocking the western entrance was even heavier than on the eastern side, but the *Sunbeam* kept at it. Outside the harbor, as far as the eye could see to the West and North, was one vast, flat field of ice through which showed only the tops of the myriad of spruce-capped islands which are a part of the outer Bluehill Bay area. A fisherman aboard remarked that this was the worst he had seen since the winter of 1917 and 1918.

"With a doggedness and quiet strength which drew from the usually silent fishermen passengers many words of affectionate respect, the little ship nosed her way over the ten intervening miles of ice-covered capsized buoys and along sea lanes from which markers had completely disappeared.

"An hour only at Stonington to load six tons of freight—oranges, flour, cheese, canned baby foods, nails, engine parts and sacks of mail—all in delightful propinquity, and with passengers aboard, we were Swans Island bound.

"A crowd had heard the *Sunbeam's* whistle and was down at the wharf to greet us. In astonishingly short time, cargo and passengers were on the dock and grateful eyes watched our little ship disappear around the harbor mouth, headed for Frenchboro to deliver their mail and provisions.

"February 17th and we were on our way again to the assistance of these same islands. Ice this time covered the entire Frenchman's Bluehill and Penobscot Bay areas—ice from four to six inches thick—and it was beginning to snow. As we broke our way along, a small patch of open water was a novelty and all rushed to the port lights to see it, including the patient returning home from a visit to the doctor.

"Some hours later at Stonington the freight agent told us Isle au Haut had not been heard from since the 13th, which meant that their boats were all locked in the ice, and they could not get out. There was no telephone communication to this island, and no boat available to go out and see if all was well. A hurried telephone call to the wharf brought the waiting Isle au Haut mail from the Stonington post office. We decided to visit this island before returning to Swans Island.

"We made our way toward the island of famed beauty, stopping at the edge of the heavy harbor ice to lower a ladder over the bow of the boat. A group of volunteers from the passengers started across the trackless waste of ice led by one of the party who felt his way with a pick pole for water holes, and the rest of us followed with the sacks of mail on our backs. The sound of our whistle had been heard through the fast falling snow. A party of men, each with an oar, came out to meet us. Out there on a field of ice we delivered the United States mail. The news that 'All is well' was welcome indeed.

"A very brief meeting and we hurried back to the boat, for it was snowing hard and darkness was only an hour away. Across ten miles of gray water strewn with ice broken by the fury of the rising storm, and just as the blanket of night closed down we rounded Hockamock Head and entered the safety of Swans Island Harbor.

"A fiery red sun looked down on the harbor the next morning, tinting the ice a peculiar color as we punched our way outside and headed for Frenchboro with mail and provisions. Then, as we docked at Northeast Harbor, we were told that another call was waiting. We were needed again to carry mail and food to Cranberry Isles and Islesford."

It was intensely cold and the Damariscotta River was blocked with ice. A Navy transport

Rev. Neal D. Bousfield, Superintendent, Main Sea Coast Missionary Society, Bar Harbor, Maine.

The "Sunbeam" releases ice-bound Army transport and tows it to sea for urgent duty.

was ready to be sent to Rockland for completion. The boat yard appealed to the Government, but the Navy Department had replied that it had only one ice breaker left on the entire New England coast and it had been decided not to risk this boat in the narrow river channel which could so easily spell disaster.

Desperate, the shipyard appealed to towing companies all along the coast and as far away as New York but all refused to attempt to break the heavy ice of the narrow and tortuous channel. The transport must be released from the ice or it would have to remain there until the river opened in the spring. At least two precious months would be lost before the anxiously awaited transport could be delivered.

There was a last hope. A message came to the mission from the builder: "Do you think the *Sunbeam* could do it?"

"We replied that we did not know but that we could come and look the situation over," said the Rev. Neal D. Bousfield, Superintendent of the mission. "So, with half an hour to get ready, we started. The wind was blowing a gale, Northwest, and the temperature was close to zero.

"Darkness, which came quickly, overtook us as we entered the Fox Island Thoroughfare. Ice obscured the pilot house windows and from stem to stern bitter cold and wind had piled the frozen spray in many fantastic patterns.

"The decision was soon reached to tie up at North Haven until morning. Just before dawn, we were on our way again. The Thoroughfare had iced over during the night and we left a well marked path as we broke our way to open water.

"Just at noon on January 7th, the ice of the Damariscotta River was sighted. Three years almost to a day had passed since the government ice breaker had rescued the new *Sunbeam* from the ice of this same river. Now the *Sunbeam* was returning to her birthplace similarly to assist the government and the boat builder. "Four miles of ice lay ahead. The *Sunbeam* went to her task like something alive. Thicker and thicker grew the ice as she pushed her way upstream. Slower and slower was her progress. Then the ice became so heavy the boat had to back off and run up on it, sometimes with her bow poised three feet out of water. Men from the yard came down over the ice to meet us and to watch. Then, at 3:30 p.m., amidst the cheers of the crowd which had gathered on the shores to watch, the last foot of ice between the *Sunbeam* and her objective was broken.

"With but a few minutes lapse of time to adjust tow lines, the brave little *Sunbeam*, hauling the towering form of the 110 footer, fought its way through the narrow channel, gaining speed as the ice grew thinner and at last reaching open water. Darkness found us rounding Pemaquid Point and then on into the night across the remaining 35 miles of winter seas to the safety of Rockland Harbor, where we arrived at 10:00."

A woman died. She wished to be buried on Matinicus Island. She wished to be carried there by the *Sunbeam*, the missionary pastor to conduct the services. Mission accomplished. And then—

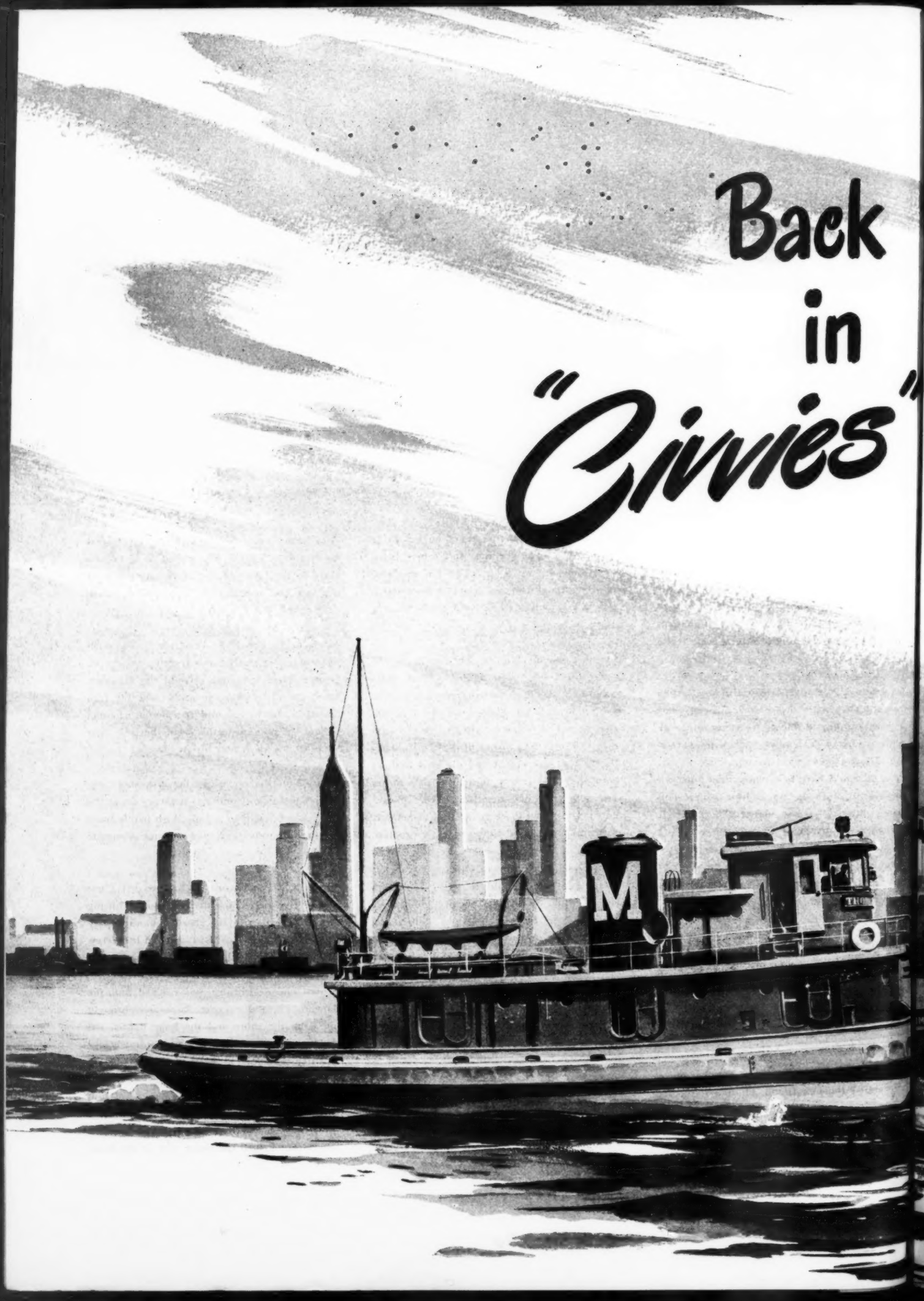
January 11. The Navy Department. A much needed lighter ready for launching but the St. George River icebound. Would the *Sunbeam* get it out? The *Sunbeam* would—and did. Into a narrow, uncharted and treacherous channel —"into the jaws of death"—went the little boat who did not know how to say, "No."

The 178-foot lighter lunged down the ways into the icy waters and snubbers became taut as the barge was brought to a stop. With barely space to turn around, the *Sunbeam* came alongside and the tow lines were adjusted.

Through a river channel so narrow that a few feet off the course on either side meant hitting the rocks, and with the channel blocked with ice, the solid little boat with its solid little crew threaded its way with its precious tow.

At last the drawbridge was reached and the dangerous errand was over. Ropes were brought out from the shore and the huge lighter was slowly eased through the narrow drawbridge and tied to a dock to await a tug.

The story is over. The war is over. But it is little stories like this, coming from hundreds of sections of our nation, which tell how the home front helped the brave men at the front.


Back
in
"Civies"
M

KEEP AMERICA STRONG
BUY VICTORY BONDS

The Thomas E. Moran is back on her old job.

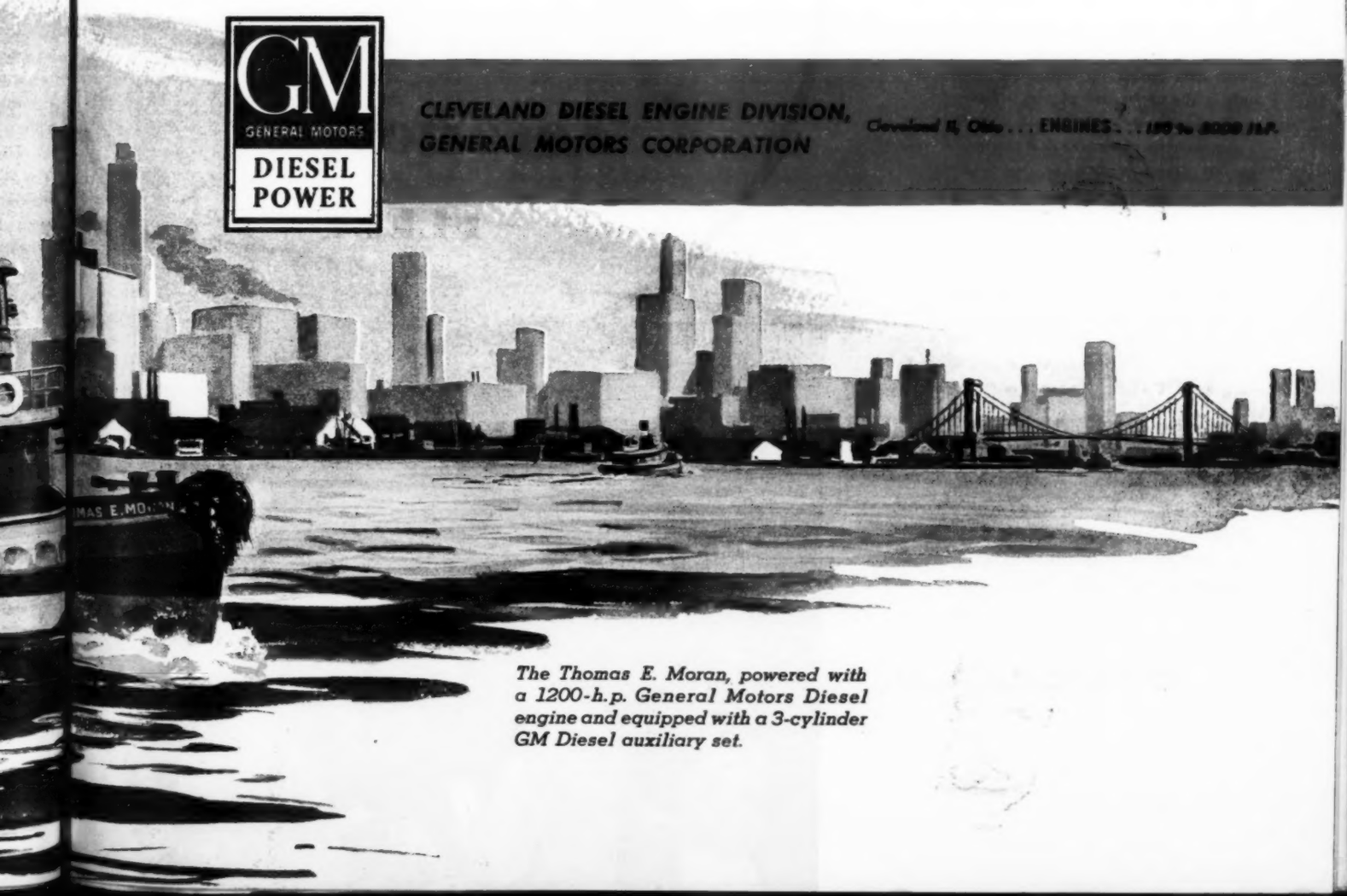
As part of her reconversion into civilian life, she got a new 2-cycle General Motors Diesel engine with 1200 agile horsepower.

Her new engine takes the same space as her previous one, but it delivers about twice the shaft horsepower.

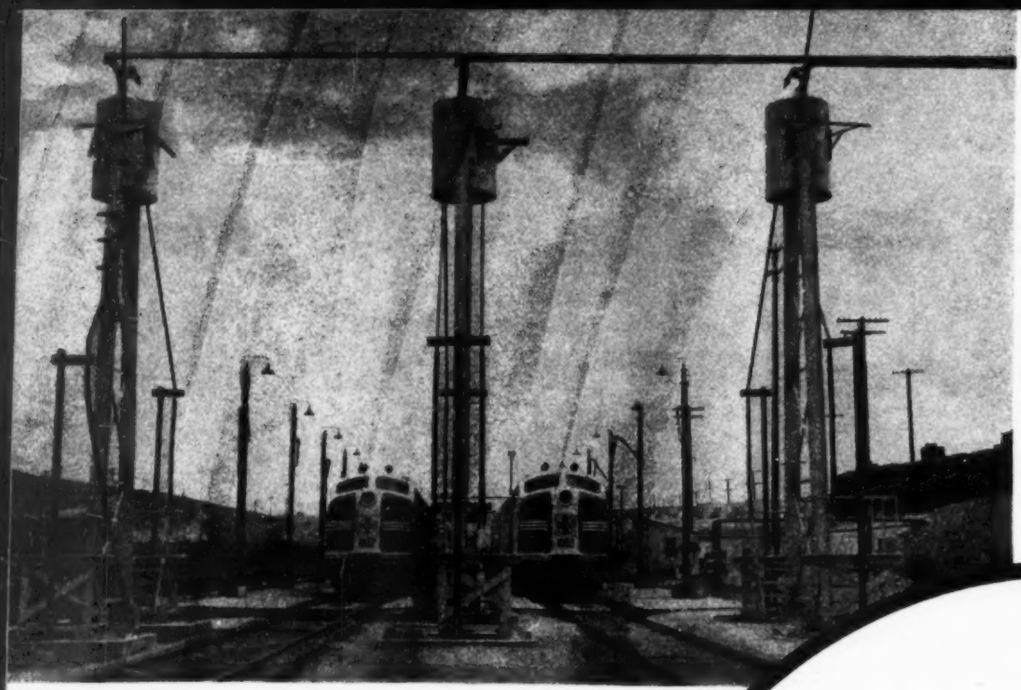
That's a fact any boat operator can translate into extra profit!

GM
GENERAL MOTORS
DIESEL POWER

CLEVELAND DIESEL ENGINE DIVISION, GENERAL MOTORS CORPORATION Cleveland 11, Ohio . . . ENGINES . . . 150 to 2000 H.P.



The Thomas E. Moran, powered with a 1200-h.p. General Motors Diesel engine and equipped with a 3-cylinder GM Diesel auxiliary set.



Sand towers and fuel rack, Diesel shop at Barstow, California.

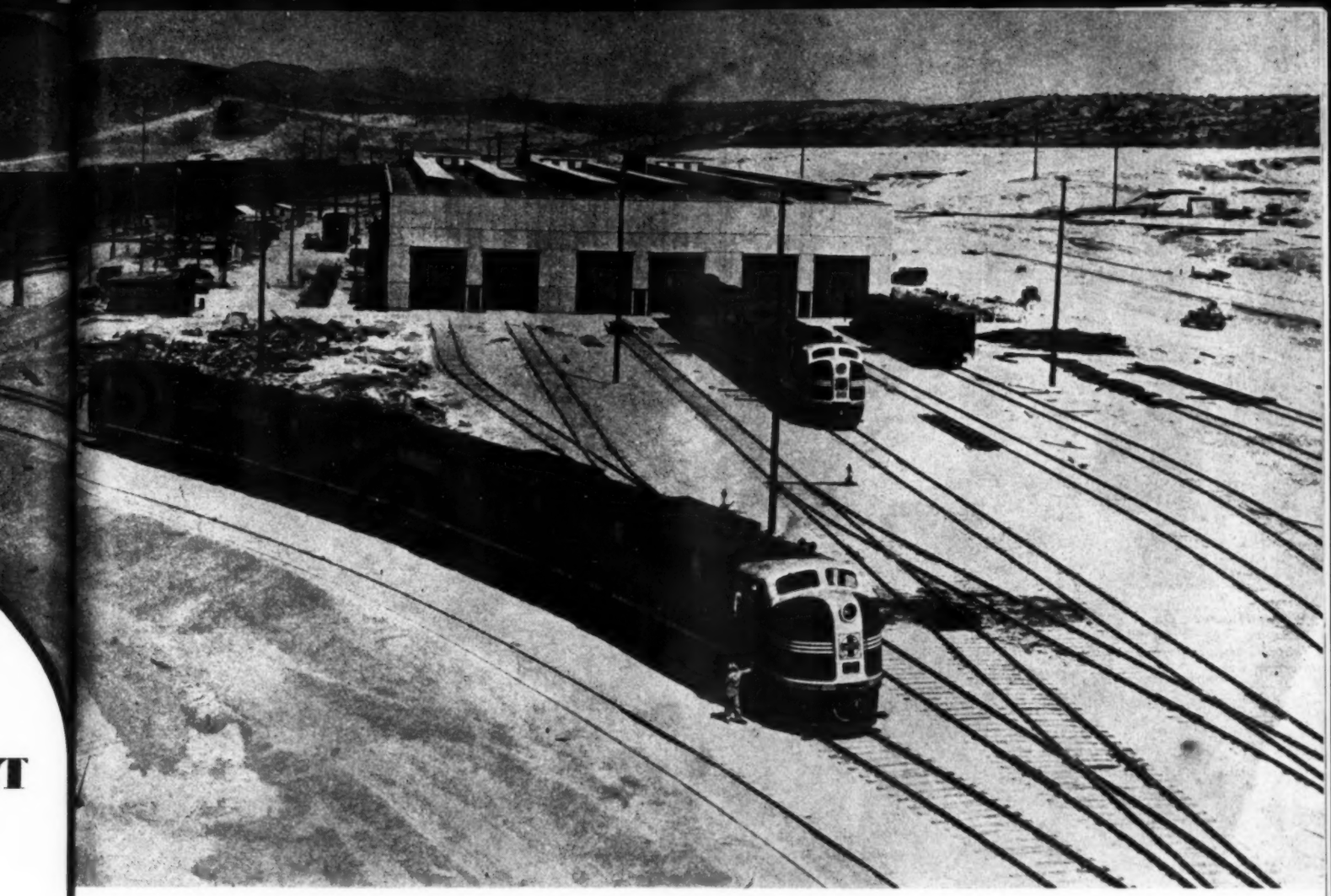
SERVICING THE WORLD'S LARGEST (SANTA FE) DIESEL LOCOMOTIVE FLEET

By CHARLES F. A. MANN

THE picturesque Santa Fe-Fred Harvey pioneering era comes to life at a time when the Santa Fe's operating and mechanical departments have pushed up to a dozen world's records in the application of a new form of railroad motive power—Diesel—and in itself set up a glamorous sort of mechanical rhythm in some 650,000 Diesel horsepower that will be in service on the Santa Fe by the end of 1945.

The world's largest fleet of Diesels on any railroad has given rise to so many problems of integrating a $50,000,000 Diesel investment into a 1½ billion dollar railroad empire that stretches from Chicago to the Gulf and on to California, that it is difficult for this writer to pick a small point to begin. Nearly 5,000 employees on the Santa Fe are now trained in Diesel—the largest single Diesel personnel army in the world under one paymaster. Not only is Santa Fe Diesel an astounding technological thing, but it is one of the most amazing human things in the present decade. And remember, ten years ago in August of this year, Santa Fe gingerly received its first Diesel.

Work board shows locomotive arrivals and required inspections or repairs.



General view of the Barstow Diesel shop and yards.

The broad pattern of Santa Fe Dieselization calls for two distinct phases of mainline Diesel operation—the passenger fleet of streamliners that skeleton the whole system—sort of override the steam operation throughout all the principal routes. 24 passenger Diesel units (15 locomotives) have carried on this service, and 22 more Diesel locomotives (46 units) are on order. Freight Diesels, seventy-eight 5400 hp. 4-unit General Motors design, the largest Diesel fleet of its kind, are now concentrated in the 663-mile Western territory between Winslow-Barstow-Bakersfield and San Bernardino, and comprise a compact, nearly 100% Diesel railroad unit. This area will soon see no more of steam. The 123 Diesel switchers operate at 33 primary terminals, Argentine, Kansas, yard, having the largest number of Diesel switchers, 21. Chicago has 14 and Los Angeles 11.

Mainline passenger and freight mileage is running close to 1,200,000 Diesel miles per month. Diesel switching hours run close to 2400 per day, and perhaps more on certain days.

Briefly, maintenance of Diesels is based on a simple preventative and progressive maintenance schedule worked up from actual performance and operation of each make and class of Diesel since it was placed in service. The characteristic difference between steam and Diesel governs the whole business: steam you can load up till the old Iron Hoss just lays down and dies; Diesel you can load up till the warning bells and the needles go into the red zone, then you must slack off. But, if you do slack off intelligently, on all operating fronts, Diesel will out-perform steam 2 to 1 straight across the board!

Indoctrination of the human element to this vital, small difference; setting up "maintenance houses," the 1945 term for the old roundhouse, at proper intervals throughout the spread of track mileage, based on the above characteristic of Diesel, and strive constantly for 90-95% availability, and you have a railroad operation far simpler than electric, far cheaper and faster than steam, and you can lick your competition.

On the Santa Fe, maintenance and operation go like this:

SWITCHERS:

Operated and maintained at following points:
EASTERN LINES: Chicago, Galesburg, Shopton, Argentine, Topeka, Emporia, Atchison, Newton, Wichita, Arkansas City, Oklahoma City
WESTERN LINES: Dodge City, Waynoka, La Junta, Clovis, Vaughan, Belen
COAST LINES: Needles, Barstow, Richmond, Los Angeles, Bakersfield, Fresno, Oakland, San Diego, Calwa, Stockton, San Bernardino.
TEXAS LINES: Brownwood, Sweetwater, Galveston, Ft. Worth, Cleburne

PASSENGERS:

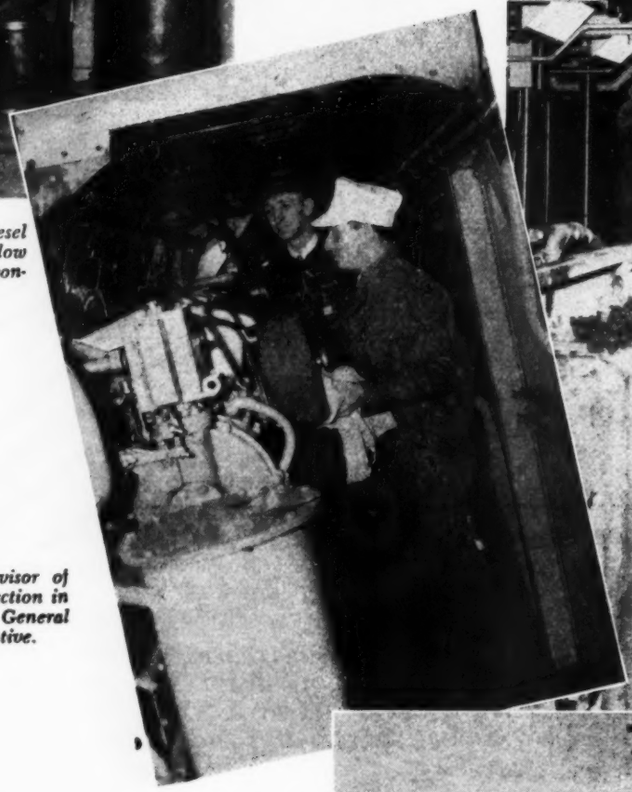
Maintained at following points: Chicago (principal Eastern point), Tulsa, Los Angeles, San Diego, Richmond, Bakersfield

FREIGHT:

Winslow, Barstow, San Bernardino, Argentine

Chicago first became a Diesel maintenance center in 1939, to handle Coast and Texas and Kansas City trains, followed by Argentine in 1941, to handle, temporarily, the freight Diesels. Since then, with the freights concentrated mostly in the Far West, Winslow and Barstow have become the No. 1 spots on the entire System.

Walter Huebner, Diesel foreman at Winslow shop, inspects a connecting rod.



T. T. Bickle, supervisor of Diesels, making inspection in engine room of General Motors Diesel locomotive.

Left to right: L. D. Weaver, apprentice, and J. R. Smith, machinist, making inspection.

Fueling Diesel No. 155 at Barstow.

W. D. Hart, machinist at Barstow, honing cylinder liner.

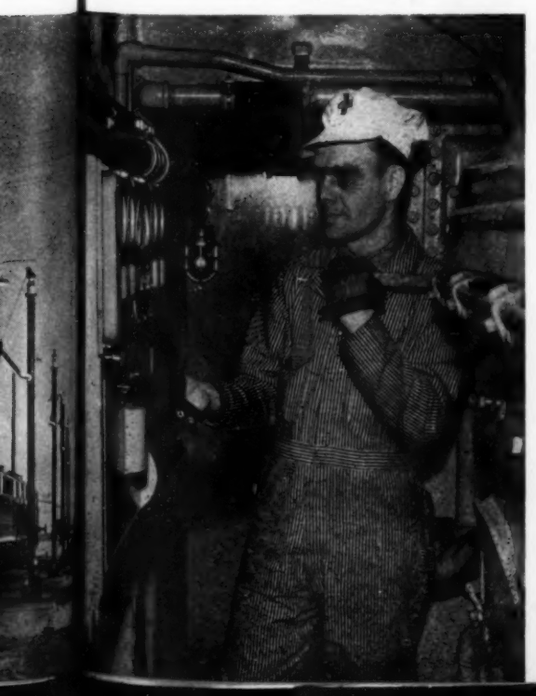
Automatic wash rack at Barstow.

J. P. Morris, mechanical assistant, Chicago, watching fueling operation.

All passenger power for the entire System gets its heavy repairs at Chicago, as well as running repairs on all locomotives operating out of Chicago terminal ("Garage-Service Station" type of work).

Due to peculiarities inherited from the past, the giant Santa Fe shops at San Bernardino naturally inherit certain heavy Diesel and electric repair and rebuilding work from Barstow and Winslow, two points where highly skilled mechanical help is hard to hold. In January, 1944 work was undertaken at San Bernardino to convert a portion of the tank shop over to make heavy repairs on Diesels. Facilities generally, were provided to make factory-type repairs and rebuild motors, generators and Diesel engines. Full four-hour load tests and ICC inspections are conducted here. Motor and generator repairs and rebuild jobs are done here, instead of sending them back to the factory. Equipment consists of all types of machines, thermostatically controlled baking ovens and soldering pots, dynamic balancing machine, banding and undercutting machines, vacuum impregnating machine, motor generator set for operating and testing motors.

V. L. Marlo, Diesel foreman at Barstow, checks engine gauges.



The personnel organization, starting with a couple of maintainers and a part-time boss in Chicago back in September, 1935, has since grown until over 200 have been trained and 50 promoted to key positions in this important Diesel department. Youthful T. T. Bickle heads the organization, working under John Morris, General Mechanical Assistant for the System. Following is the Diesel department official staff of the Santa Fe: T. T. Bickle, Supervisor of Diesel Engines System, Chicago; J. A. Schneider, Assistant to Mr. Bickle, Chicago; H. F. Mackey, Assistant Supervisor of Diesel for the Coast Lines at Los Angeles, and the following Assistant Supervisors at strategic points: C. A. Wilson and G. B. Hay, Chicago; T. A. Stewart, H. L. Hawkins, H. G. Hefner, H. E. Bristow, G. E. Rodgers, G. A. Clements, all at Needles, Cal.; C. S. Reed, H. R. Pfiester, F. B. Dickens, L. L. Luthey at Barstow; L. W. Brooks, R. E. Blumheim, H. I. Powell and C. I. Bowman all at Winslow. V. L. Marlo is Diesel foreman at Barstow and Walter Huebner is Diesel foreman at Winslow, the two big shops illustrated herewith.

There are 32 Diesel maintainers who ride Santa Fe Diesels, stationed at Chicago, Shopton, Emporia, Chanute, Arkansas City, Dodge City, Albuquerque, Winslow, Bakersfield, Richmond, Los Angeles and San Diego.

DIESEL FACILITIES AT BARSTOW, CAL.

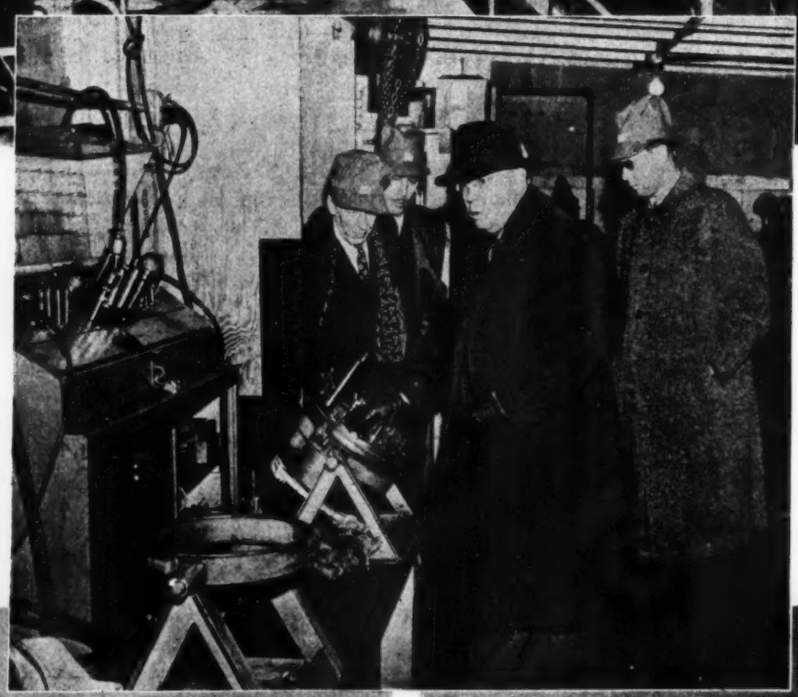
Essentially a pre-war breakup point for freight trains going over the Coast Range, with comparatively little motive power angles except a terminal-turnaround point for helper engines used on Cajon Pass, Barstow, in the extension of Diesel enmasse to San Bernardino and Bakersfield, suddenly needed a huge, modern "square roundhouse" to provide high speed "service station" facilities for turning Diesels coming from both directions, West, and Winslow on the East. The historic big general shop at San Bernardino fulfilled its functions in the age of steam, but the age of Diesel created a brand new problem at Barstow. Here, then, has been constructed a brand new steel, concrete and brick Diesel shop. The facilities were constructed separately from existing Santa Fe roundhouse facilities for steam. The power plant was enlarged to provide a water distilling plant. Present plans call for the quarterly and semi-annual inspections of all Diesels at Barstow, and if future 100% Dieselization of the Coast Lines develops as many think it will, the facilities are designed to permit future additions.

Actually Barstow Diesel facilities are a glorified railroad locomotive service station, with emphasis on washing, fuelling, sanding, lubrication, filters, and certain fine mechanical Diesel engine repairs. It is too close to San Bernardino to not avail the railroad of the spacious heavy repair facilities located there, hence San Bernardino balances the facilities at Winslow, while all "garage work" will center at Barstow. Heavy repairs such as generator, traction motor, crankshaft removals, etc., will be done at San Bernardino. However a special glass enclosed workroom is fitted at Barstow to grind injector pumps, in a pure atmosphere free of dust and drafts and in good light.

Renamed "Maintenance House," first of the streamlined 1945 versions of the old-fashioned railway "Roundhouse," Barstow's service platform, 270 ft. long has two tracks to accommodate two 4-unit Diesels at one time. It is completely serviced by underground piping and overhead delivery hose system permitting refuelling of two complete locomotives in three or four minutes. Washing is likewise almost a continuous, belt-line performance. The whole plant can turn and service and clean a Diesel in less than an hour.

Inside the model maintenance house is the dream plan of arrangement. High walls with tall areas of glass, floodlit for night use and of concrete and steel; two complete working levels are provided. The main tracks are 3½ feet above the depressed runway between each pair of tracks, from which ascending ramps lead to the main floors. Above this, with 7 ft. clearance between, are floor-level, water thin steel and concrete upper platforms fed by ascending ramps. This arrangement, plus side-pit illumination beneath the tracks; good indirect lighting beneath the upper platform as well as focused light above, permits a crew to work on two levels at the same time—on the running gear, wheels, motors, tank, etc., below, and on the Diesel and electric equipment on the main level, without getting in each other's hair. Rubber tired trucks whiz parts back and forth from stockbins to the Diesel, on two levels. Large lockers, workrooms, tool rooms and every facility for speedy handling are provided.

Diesel-electric locomotives by the dozen cluster around outdoor servicing facilities at Winslow.



W. P. Hartman, mechanical superintendent Coast Lines, inspects a Diesel cylinder head.

Outbound Diesel No. 139 leaving Winslow shop ready to pull next freight over mountain and desert to Barstow.

Fueling platform at Winslow.

The main building is 138 ft. wide and 250 ft. long, and has six complete tracks with dual platforms, to enable it to handle six 4-unit Diesel freighters at the same time. Yard tracks double this capacity, so that 12 or 15 complete locomotives can be serviced and given quick inspection and light repairs at the same time. Literally, the handsome Barstow maintenance house is the last word in railroad garages, with every automotive garage trick incorporated into the layout. A 55,000 bbl. Diesel fuel oil storage tank is fitted outside the main building. Large new and used lube oil tanks and raw, treated and distilled water tanks are to be incorporated in the layout. The building is served by a 10 ton, 40 ft. span travelling crane to serve all six tracks inside and a battery of hydraulic lifting jacks as well as some new machine tools for shop work.

If Barstow "maintenance house" is a success from a design standpoint, it is the first of probably 10 similar installations throughout the Santa Fe System.

DIESEL FACILITIES AT WINSLOW, ARIZONA

Facilities at Winslow, naturally centered originally around steam power. As the fleet grew, Diesel began pushing steam back, despite enormous increase in traffic that used up all the steam power on runs East of Winslow. It was originally planned to erect a brand new type Diesel facility at Winslow where none existed before, but at present the Winslow operation is essentially a revamping and enlarging of steam facilities, and converting a large chunk of it to Diesel. The overall picture at Winslow is to completely "turn" a Diesel, refuel, re-water, sand, wash, inspect and okay a 5400 hp. freighter in 90 minutes and send it back West with full load. Up to 2300 cars of freight traffic move through Winslow each 24 hours, and at the peak in 1945, a train of some kind moved through every 12 minutes, 24 hours of the day!

The steam roundhouse at Winslow was literally sawed into, with thick firewall between steam and Diesel sections erected to keep dust, dirt, and smoke out of the Diesel facilities. Twelve stalls of the roundhouse were taken over, leaving 14 for steamers serving the East end of the District. Four tracks left on the steam side of the firewall were truck, power wheel and traction motor overhaul and change-out were changed but little. Cab-level platforms were constructed on the 8 Diesel stalls, and six additional tracks were installed. Depth from wall to wall of the 8 stalls is 124 feet, to accommodate two sections of a 5400 Diesel freighter. Three of the stalls are 200 ft. long, also with elevated platforms, served by ramps, accommodate a full size 4-unit Diesel. Platforms between these stalls each contain piping and conduit for high pressure steam, raw water, distilled water for the Diesel cooling systems, new lube oil, drainage for old lube oil, compressed air and electric power and lighting outlets. A cleaning room for chemically cleaning of air, oil and lube filters, is provided, which also handles cleaning of other parts. There is a small shop for running repairs to locomotive parts such as cylinder heads, valves, liners, etc., which includes the most modern machinery to hone cylinders, work on injector nozzles, etc.

All told the Winslow Diesel facility will handle a total of thirty-four 1350 hp. Diesel freight units at one time. A modern wheel lathe, 24 inch engine lathe, planer, grinders and an 18 inch engine lathe are installed. A new 10 ton overhead crane for the overhaul section and a 7½ ton crane besides, are additional items of equipment.

A complete Diesel fueling station was built, which includes a 200,000 gal. delivery tank and a 55,000-barrel storage tank. The Diesel fuelling station has two platforms capable of serving two complete Diesel locomotives of 4 units each, at one time. Sanding and washing facilities; two 30,000 lube oil tanks and a 20,000 gal. reclaimed oil tank were added. All waste oil on the Santa Fe eventually winds up at Topeka, Kansas, where it is re-refined and shipped back to be re-used.

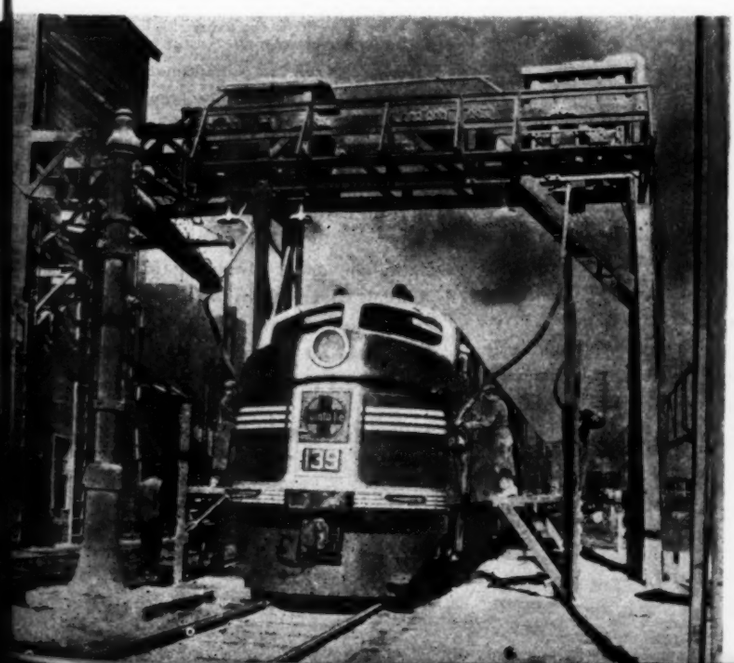
With each 1350 hp. Diesel holding 190 gallons of lube oil in its crankcase, changed every 20,000 miles, lube oil consumption at Winslow alone is over 50,000 gallons monthly. 1½ million gallons of Diesel fuel oil are pumped monthly here, too.

A completely modern water distilling plant was fitted at Winslow, which turns out 23,000 gallons of distilled, chemically inhibited water (treated to prevent corrosion) each 24 hours. A 40,000 gallon tank is fitted for this purpose. Distilled water on the Santa Fe's Diesel region is a costly item—it averages about $10.00 per 1,000 gallons. $100 per day for distilled locomotive radiator water at Winslow alone!! All piping layouts to serve the new facilities are laid underground and protected to temperatures as low as 10 below zero, which sometimes occur. Store facilities to enable rapid dispensing of supply items for the locomotives are indexed and labelled, and operated on a 24 hour basis. For example, approximately 2640 lube oil filters are used in one month.

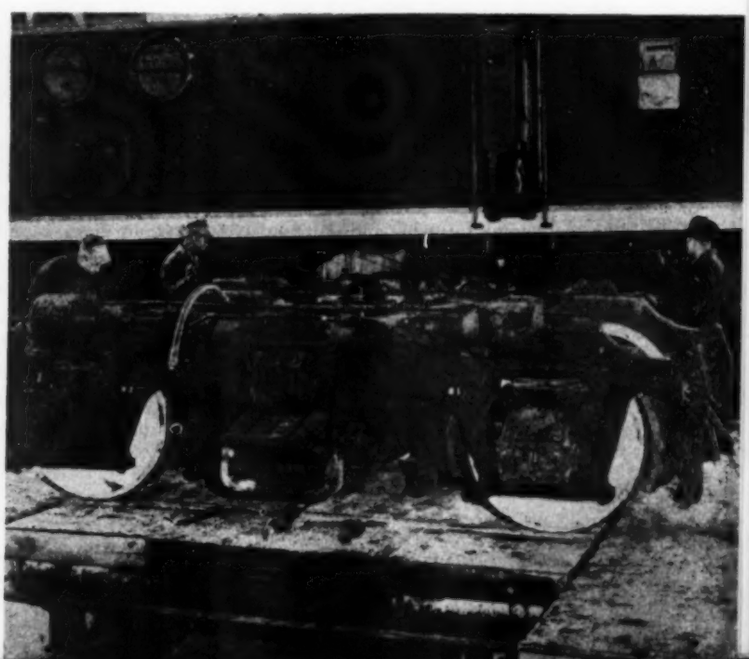
A TYPICAL "SERVICE STATION" ROUTINE

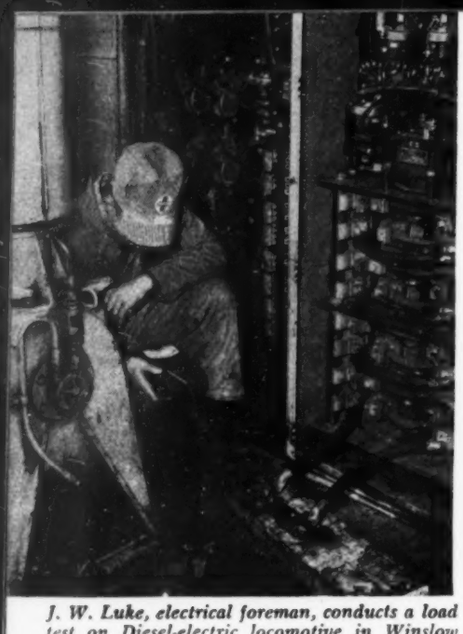
A Diesel arriving from the West moves to the inbound track and is spotted at the fueling station. Pumps with capacity of 500 gpm. pour from 1200 to 1300 gallons of fuel into each of

Filling the side (sand) pockets of locomotive No. 139. Trucks are cleaned with steam jets at same time.

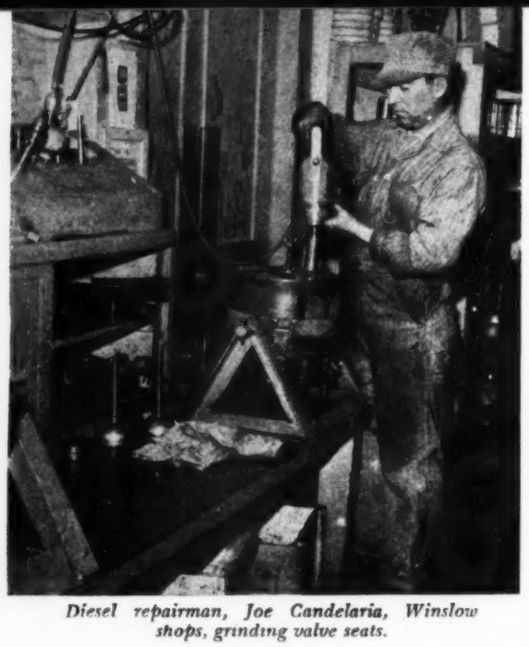


Four 100-ton jacks raise the 115-ton locomotive body while a new truck is rolled under by means of transfer table.





J. W. Luke, electrical foreman, conducts a load test on Diesel-electric locomotive in Winslow shop.



Diesel repairman, Joe Candelaria, Winslow shops, grinding valve seats.

New oil filters are loaded from servicing docks at Winslow.

A. Lea, Diesel repairman (foreground) and Rex Diersdorf, Winslow shop, install reconditioned liner.

the 4 units in something less than 8 minutes. It next moves to the sanding station where its side pockets are filled with sand at 16 points, 4 to a unit. Then it gradually moves through the wash rack where workers using high pressure steam jets and water wash off the body and trucks. After that it is inspected for defects or items in the overlapping series of maintenance routines. If nothing requires attention on this particular trip, it moves straight across the roundhouse turntable and onto the Westbound Diesel lead track, ready for the next train. The maintenance routines generally work out in progressive steps of about 2000 miles of operation. So smoothly has the routine been worked out, that a complete change of liner, piston, con rod and valve assembly is made in about 1 hour and 45 minutes. Once they did it in only 55 minutes. All power trucks on the 300-odd Diesel freight units now on this 663 mile Region are maintained at Winslow. Changes can be made on a complete truck assembly in 1½ to two hours. Four spare trucks are kept on hand at all times. From 90 to 100 trucks are changed out and overhauled monthly at Winslow, an average of 3 per day. A special transfer table, using four, 100 ton power jacks simply lifts the body off the trucks and the new unit is rolled under. The 3 ton traction motor assembly is likewise quickly lifted out of a truck and replaced—this is done every 200,000 miles of service per motor. Over 70 traction motors are changed out monthly at Winslow. All motor and generator repair work is done in a special section of the San Bernardino general shops. The sheer volume of work at Winslow establishes it at once as the busiest Diesel shop facility operated by any railroad on earth!

Each make and type of Diesel on the Santa Fe has a complete routine maintenance schedule worked out for it, by trips, weeks, six months, years and more years. Space does not permit listing each work item in detail, but the following digest of the items, by periods, to the initiated, will make sense. It is of great interest to observe how the maintenance routines vary for each manufacturer's Diesel locomotive, and each improved model and whether it be passenger, switcher or freight, lubrication is paramount in all, with mechanical, then electrical, then running gear in order. Passenger maintenance items on account of the heating boilers alone nearly doubles the time and item-count for passenger Diesels—radiators, motors and generator cooling and lubrication govern efficient operation of freighters more than anything else.

All the above items are based on a systematic flow of field reports from engineers, firemen, maintainers, supervisors, etc., and maintenance house employees, and a series of master records are built up on each locomotive and maintained thereafter till that particular locomotive is scrapped.

Innumerable experiments to improve the Diesel locomotive are going on all the time on the Santa Fe . . . at one time this Summer 25 different experiments were underway simultaneously on the huge fleet. The whole subject of dynamic brakes was born and brought to maturity on the Santa Fe. Pneumatic, automatic radiator shutters were another. Experiments on 4 and 6 wheel engine trucks were another. And so on over a huge range of items that brought Diesel, in 10 years, to America's white hope for railroad power.

The Santa Fe holds the world's record for a 36 hour Diesel passenger train on the Chicago-Los Angeles run . . . it hauls more freight, more passengers and does more hours of switching with Diesel than any other railroad in the world. By 1946 it will Dieselize practically all its mainline passenger trains between Chicago and the Pacific Coast.

Its million dollar investment in Barstow and Winslow Diesel shops may not even be big enough to do the work within another year or two. And so it goes on the Santa Fe—America's great Diesel railroad.

Following is the list of maintenance personnel

TABLE ONE

MAINTENANCE PROCEDURES BY DIESEL LOCOMOTIVE CLASSES,

Santa Fe Railway

The following digest will give a brief outline of the Routine Maintenance Schedule of Instructions for 14 classes of Santa Fe Diesels, for each Interval.

I. 1000 Hp. Alco Locomotives 2310 to 2321, Inclusive
Daily, 20 Check Items--Weekly, 6 Check Items---Semi-Monthly, 2 Check Items----Monthly, 29 Items----Quarterly, 12 Items---Semi-Annually, 7 Items----Annually, 20 Items----Two Years, 2 Items----Four Years, 4 Items. At wheel removal time, 3 Items (bearings, pinion gears & axle gears, Truck Journal brasses)-Item 3 no less frequently than once each six months.

II. Class 100, Equipped with EMD 16-567 or 16-567A Diesels (5400's)
Daily, or after each trip: 18 Items Mechanical, 4 Electrical & 6 Lubrication--Each 2500 Miles (Approx.): 4 Mechanical Items----Each 5,000 Miles (Approx) OR Semi-Monthly: 8 Mechanical Items; 5 Electrical Items; 5 Lubrication Items. Each 10,000 Miles or at time of Monthly Test: 14 Mechanical Items; 13 Electrical Items; 15 Lubrication Items. Each 20,000 miles or Two Months; 1 Lubricating Item (general). Each 30,000 miles or at Time of Quarterly Inspection 13 Mechanical Items; 5 Electrical Items; 8 Lubrication Items--Each 60,000 Miles or at time of Semi-Annual Inspection, 14 major General Items; Each 120,000 Miles or at time of Annual Inspection: 12 Mechanical Items; 10 Electrical Items; 3 Lubricating Items. Each 200,000 miles: Overhaul Traction Motors. Each two years at time of Annual Inspection: 9 Lesser Equipment Items. Each three years at time of annual inspection 6 major mechanical and electrical items....ON NEW OR OVERHAULED LOCOMOTIVES, after first thousand miles of service: 13 Inspection Items. After 2,000 miles of operation: 4 Inspection Items. After 6,000 miles of operation: 4 Inspection Items. After ONE MONTH OF OPERATION: Tighten Oil Cooler core headers. MISCELLANEOUS MECHANICAL: 10 items that work in to above schedules whenever an item is relevant to work being performed on the above schedules.

III. Alco Diesels 2322 to 2342 Inclusive
Daily; 18 Items. Weekly: 6 Items. Semi-Monthly: 2 Items. Monthly: 34 Items. Quarterly: 12 Items. Semi-Annually: 7 Items. Annually: 19 Items. Two years: 3 Items. Four Years: 3 Major Items. Miscellaneous:3 Items to work into above schedules whenever an item is relevant to work being performed.

IV. Diesel Locomotives 50 & 50 A--2000 Hp. Alcos
After Each Trip or Days Work: 32 Major Items. 1500 to 2000 miles: 16 Items. 4000-5000 miles: Change Lube Oil Filter Elements. 5,000 to 10,000 Miles: 6 Items. 25000 to 30000 miles; 22 items. At Time of Monthly Test: 3 Items. Two Months: 2 Items. 45,000 to 50,000 Miles, 7 Items. At Time of Quarterly Test: 16 Items. 70,000 to 75,000 miles, 4 Items. 90,000 to 100,000 Miles: 6 Items. At time of Semi-Annual Test: 2 Items. 140,000 to 150,000 Miles: 6 Items. 190,000 to 200,000 miles; 10 items. At time of Annual Test: 10 Items. 400,000 to 500,000 Miles: Dismantle & Inspect Turbocharger. Miscellaneous, 4 Items that work in to above schedules whenever an item is relevant to work being performed.

V. Class 2353--With EMD 12-567 or 12-567 A Diesels
Daily: 13 Mechanical, 3 Electrical & 5 Lubrication Items. Weekly: 7 Mechanical, 1 Electrical & 2 Lubrication. Monthly: 18 Mechanical, 7 Electrical & 10 Lubrication items. Quarterly: 11 Mechanical, 1 electrical & 4 Lubrication. Semi-Annually: 5 Mechanical, 7 Lubrication. Annual: 13 Mechanical, 5 Electrical & 2 Lubrication. Two Years: 2 Mechanical & 1 Electrical. Four years: 5 Mechanical & 2 Electrical. ON NEW OR OVERHAULED LOCOMOTIVES AFTER ONE WEEK OF SERVICE : 13 mechanical & 2 Electrical. After One Month of Service: 4 Mechanical. MISCELLANEOUS: 12 Mechanical Items and 2 Electrical Items to be performed whenever relevant items of work are it process.

VI. Alco Diesel Locomotives 2300 2301 and 2302
Daily: 20 Items. Weekly: 7 Items. Semi-Monthly: 1 Item. Monthly: 30 Items. Quarterly: 16 Items. Six Months: 3 Items. Annually: 20 Items. Two Years. 2 Items. Four Years. 3 Items. MISCELLANEOUS: 3 Items at times when relevant work is being performed on locomotive in accordance with above schedule.

VII. Class 11, with EMD 12-567 Diesel Engines (Psgr.)
After Each Trip, or Days Work: 26 Mechanical, 3 Electrical & 3 Lube. 1500 to 2500 miles: 13 Mechanical, 14 electrical & 4 Lube. 9000 to 10,000 Miles: 2 Lube Items. At Time of Monthly Inspection: 21 Mechanical, 11 Electrical and 13 Lube Items. Each 25,000 to 30,000 miles: 2 Items. At time of Quarterly Inspection: 20 Mechanical, 8 Electrical & 7 Lube. At time of Semi-Annual Inspection: 9 Mechanical. Each 200,000 miles: Overhaul traction motors. At time of Annual Inspection: 16 Mechanical, 13 Electrical & 3 Lube. Each two Years at Time of Inspection: 6 Mechanical items. Each Three Years at time of Inspection: Overhaul auxiliary generators. ON NEW OR OVERHAULED LOCOMOTIVES AFTER 2500 miles of Operation: 13 Mechanical & 3 Electrical. After 10,000 miles of Operation, 4 Mechanical. After One Month of Operation: Tighten oil cooler core headers. Miscellaneous: 12 Mechanical & 2 Electrical items that work in to above schedules whenever an item is relevant to work being performed on the above schedules.

VIII. Class 2, with Winton 12-200A Diesel Engines (Early Psgr.)
After each trip or days work: 24 Mechanical Items, 3 electrical & 3 lube Items. 1500 to 2500 miles, 12 Mechanical & 4 Electrical & 4 Lube Items. 9000 to 10,000 miles, 2 Lube Items. At time of Monthly test: 15 mechanical, 12 electrical & 10 Lube Items. Each 25,000 to 30,000 miles: 2 major Lube Items. At time of Quarterly Test: 17 Mechanical, 8 Electrical and 6 Lube Items. At time of Semi-Annual Test: 8 Mechanical Items. 140,000 to 150,000 miles: Remove, recondition pistons, liners and heads. Each 200,000 miles: Overhaul traction motors. At time of Annual Test: 15 mechanical. 13 Electrical and 3 Lube Items. Each two years at time of Annual Inspection: 6 Auxiliary Equipment Items. Each Three Years at Time of Annual Inspection: Overhaul Auxiliary Generators. ON OVERHAULED LOCOMOTIVES AFTER 2500 MILES OF OPERATION: 1 Mechanical Item. Each 200,000 miles. Overhaul traction motors. At time of Annual Test: 15 Mechanical, 4 Electrical.

IX. Class 2150, With Winton 8-201 A Engines
Daily: 12 Mechanical, 3 Electrical & 5 Lube. Weekly: 6 Mechanical, 1 electrical and 3 Lube. Monthly: 17 Mechanical, 8 Electrical & 9 Lube. Quarterly: 10 Mechanical, 3 lube. Semi-Annually, 5 Mechanical & 5 Lube. Annually: 12 mechanical, 6 electrical 1 Lube. Two years: 4 Mechanical & 1 Electrical. Four Years: 3 Mechanical & 2 Electrical. ON OVERHAULED LOCOMOTIVES AFTER ONE WEEK OF SERVICE: 10 Mechanical and 2 Electrical. After One Month of Service: 5 Mechanical. Miscellaneous: 11 Items that work in to above schedules whenever an item is relevant to work being performed at that time. Also 2 Electrical Items.

X. Class 2350 Equipped with Winton 12-201 A Diesels (Switchers)
Daily: 13 Mechanical and 3 Electrical and 5 Lube Items. Weekly: 6 Mechanical, 1 Electrical and 2 Lube Items. Monthly: 17 Mechanical, 8 Electrical & 9 Lube Items. Quarterly: 10 Mechanical, 3 Lube Items. Semi-Annually: 5 Mechanical and 5 Lube Items. Annually: 13 Mechanical, 6 Electrical and 1 Lube Item. Two Years: 3 mechanical, 1 electrical Item. Four years: 3 mechanical & 2 electrical. ON OVSRHAULED LOCOMOTIVES AFTER ONE WEEK OF SERVICE: 10 mechanical Items, 2 Electrical Items. After One Month of Service: 5 Mechanical Items. MISCELLANEOUS: 11 Mechanical and 2 Electrical Items that work in to above schedules whenever an item is relevant to work being performed on the above schedules.

XI. Class 2201 Diesels With Baldwin-De La Vergne 8 cyl VO Diesels (Sw)
Daily: 15 Mechanical, 3 Electrical and 4 Lube Items. Weekly: 5 Mechanical, 1 electrical and 3 Lube Items. Monthly: 19 Mechanical 8 Electrical and 14 Lube Items. Quarterly: 15 Mechanical, 8 Lube Items. Semi-Annually: 2 Lube and 2 Mechanical Items. Annually: 11 Mechanical 5 Electrical and 1 Lube. Two Years: 3 Mechanical & 1 Electrical. Four Years: 2 Mechanical & 2 Electrical. ON NEW OR OVERHAULED LOCOMOTIVES AFTER ONE WEEK OF SERVICE: 10 Mechanical and 2 electric. After 1 month of service: 3 Mechanical. MISCELLANEOUS: 9 Mechanical & 2 Electrical Items that work in to above schedules whenever an item is relevant to work being performed.

XII. Whitcomb, Bessler H GE 44-ton Switchers
Daily: 16 mechanical items, 3 electrical and 4 Lube Items. Weekly: 4 mechanical & 1 electric & 6 Lube Items. Semi-Monthly: 10 mechanical, 5 electrical, & 1 Lube. Every month or every 680 hours on Hour Meter attached to Diesel Engine: 6 Mechanical, 1 Electrical and 7 Lube Items. Quarterly: 8 Mechanical, 2 Lube. Every 3 Months or 2000 hours on Hour Meter: 1 mechanical, and 4 Lube Items. Semi-Annually: 2 Mechanical and 4 Lube. Annually: 10 Mechanical and 6 electrical. Every 2 years or 16,000 hours on the Engine Meter: 1 mechanical & 1 Electrical. Four Years: Compressor overhaul & 2 Electrical Items. MISCELLANEOUS: 5 items Mechanical & 2 electrical Items that work in to above schedules whenever an item is relevant to work being performed at that time.

XIII. Class 1 Diesel Locomotives with Winton 12-201 Engines (Psgr.)
After Each Trip or Days Work: 24 Mechanical & 3 Electrical & 3 Lube Items. 1500 to 2500 Miles: 13 Mechanical, 4 electrical and 4 lube Items. 9000 to 10,000 miles: 3 Lube Items. Monthly Inspection Time. 16 Mechanical, 12 Electrical & 8 Lube Items. 25,000 to 30,000 miles, 2 Lube Items. At Time of Quarterly Test: 21 Mechanical and 7 Electrical & 7 Lube Items. At time of Semi-Annual Test: 7 Mechanical. 140 to 150,000 miles: Recondition liners, pistons and heads. Each 200,000 miles: Overhaul traction motors. At time of Annual Inspection: 15 Mechanical & 13 Electrical & 3 Lube Items. Each Two Years at Annual Inspection: 10 mechanical and 3 Electrical. NEW OR OVERHAULED LOCOMOTIVES AFTER 10,000 miles of operation: 4 Mechanical adjustments. After one month of operation: Tighten Oil Cooler core headers. MISCELLANEOUS: 11 Mechanical and 2 Electrical Items that work in to above schedules whenever an item is relevant to work being performed at that time.

that actually does the job of keeping Diesels rolling on the Santa Fe:

CHICAGO: V. C. Golden, C. N. Schneider, R. M. Milton, W. J. Halman, V. K. Pound.

WINSLOW: W. L. Huebner, J. R. Walkup, G. F. Sgitocovich, C. H. Tasher, J. W. Luke, H. W. Sellards, L. B. Mast, H. K. Abbitt, L. B. McCall, J. Galvin.

BARSTOW: V. L. Marlo, M. H. Bellomy, H. D. Smedley, D. L. Quaney, I. V. Davies, R. A. Gamble, W. E. Seagraves, K. P. Biddle.

SAN BERNARDINO: H. M. Boynton, O. H. Amborn, F. Breitling, H. K. Lanning, M. Florey, R. B. Stephenson, E. O. Johnson, E. H. Hahn.

LOS ANGELES: J. M. Grubbs, A. Mansheim.

PRINCIPAL FORMS USED BY THE SANTA FE OPERATING DEPARTMENT AS A BASIS FOR ALL MAINTENANCE ROUTINES

1. Monthly Locomotive Unit Inspection & Repair Report
2. Quarterly Boiler Inspection & Repair Report (Heating Boilers on Diesel Locomotives)
3. "Traingram", quick report on Train Handling, from Diesel Maintainer giving arrival & departures, load, behavior on heavy grades etc.
4. Train Report--similar to Traingram, except focus is on delays
5. Diesel Maintainers report
6. Parts Record Card--dates installed & removed, Mileage, cause of removal
7. Record of Material Removed & Applied to Diesels
8. Traction Motor Report
9. Axle & Gear Parts Record
10. Traction Motor Wear-Mileage & Parts Renewal Record
11. Main Generator Wear-Mileage & Parts Renewal Record
12. Crankcase Removal Record & Repair Record Costs
13. Crankshaft Record (Mileage, Repairs, Costs of Repairs)
14. Monthly Record of Maintenance for Diesel Switchers
15. Diesel Electric Locomotive Inspection Report

(Master forms are tabulated and Cardex Records in duplicate kept of every piece on every Diesel Locomotive from the above reports that are sent in from the Field to the Operating Officers)

DIESELS FIGURE IN OIL BOOM

By HARRY WALKER

"HEY, Bud—feels like a "flat"!

We rounded a curve at the crest of a seven-mile hill, jogged along another 100 feet with Bud fighting the steering wheel, and came to a stop with the impressio... we were in a "Model T" crossing a mile-long cattle guard.

"Far as I'm concerned, they can give this road back to the Indians," I complained. "And just cast your blinkers on that temperature gauge —212—or have you cleaned your radiator lately?"

A giant Diesel transport with two oil trailers streaked past as Bud emerged to examine the tires. A few seconds later Bud's figure came into focus through the dust cloud as the transport chattered on down the washboard road.

"Yep, it's the right front," he reported, still rubbing his eyes. We stood there with our gaze following the transport's dust plume as it spiraled down into the parched valley.

"That's the 37th Diesel transport we've seen," I reminded him. "For the life of me, I don't see how they buck these hills and carry that oil back to the refineries."

We changed tires and nursed the 1941 Chevvy down the other side of the mountain. Twenty miles an hour was fast enough for State Highway 64—in such shape as it was in.

Half a dozen other Diesel transports passed us before we got through "Dripping Rock Gulch" and reached the highest pinnacle overlooking the newest oil and gas producing field in the Rocky Mountain Region—Rangely Basin, Col.

Spread out across the valley fifteen miles away, we counted 47 drilling rigs looming up through the haze. There, on land which was given to the Ute Indians under government treaty eighteen years before Colorado became a state, August 1, 1876, major oil companies of the United States are feverishly drilling for high-grade crude in one of the most spectacular oil booms to hit the Rocky Mountain area.

The land, in Northwestern Colorado near the Utah border, was held in trust for the Utes and in the ultimate disposition of the acreage, the state, unwilling to take the land at $1.25 an acre, surrendered its title and in lieu thereof accepted lands in what is now eastern Colorado. Thus most of the Rangely land still is owned by the Government.

Today there are 24 producing wells of thirty being drilled by major oil companies in a proven area of 12 square miles—plus a score of "wild cat" operations in a 36-square-mile area of Rangely Basin. An estimated 800 locations are to be drilled and approximately 30 million dollars is to be spent in developing the field, which is believed to contain 100,000 barrels of oil to the acre.

Half-way down the hill leading to the once sleepy cow-town of Rangely, we came to a neat-looking rig where new machinery had obviously just been installed. Rather unusual machinery too, as ordinary rigs go, I thought.

Bud shouldered his camera and we climbed onto the rig. It was a portable rig preparing to drill the Stanolind Oil and Gas Company's "Associated No. 1." In charge of drilling was C. W. Miller, of the Lafayette Drilling Co., Casper, Wyo.

We noticed the "power" was a brand new General Motors "Twin 6-71" Diesel combination—two units mounted side by side.

Rex D. Glasscock, service engineer of General Motors Detroit Diesel Engine Division, who had just completed the installation, supplied the answers:

"Yep, they're the first G.M. Twins ever used for oil drilling in the Rocky Mountain Region —and we're expecting another set in a day or two to handle the mud pump."

Examination showed the G.M. "Twin" consists of two basic six-cylinder Series 71 Diesel engines geared to a single driveshaft. Each engine unit has an individual clutch and throttle so that one or both units may be in use or cut out as desired. Thus the power output may be varied from idling speed on one engine to full throttle on both, as the load requires.

Glasscock said each motor of the Twin is rated at 130 hp. at 1,600 rpm., but in this application, they are so governed that they deliver 292 hp.

The General Motors Diesels were used to erect the rig for the well and are powering the Emsco drill works and hoisting drum. Stanolind expects to drill about 6,500 feet to tap the productive Weber sand. The company is drilling seven other wells in the Rangely field.

From Stanolinds Associated No. 1, we moved down the valley toward Rangely, observing drilling operati'ons at 30 sites by the California Company, Texas Co., Phillips Petroleum Co., Sharples-Wasatch-Idaho, Standard Oil Co., Newton Oil Co., Continental Oil Co. and others. Diesel prime movers predominate in the drilling operations of the field.

Our arrival at the town of Rangely was the day after the Utah Oil Refining Co., a subsidiary of Standard Oil of Indiana, had turned oil into its new ten-inch pipeline which carries the high-gravity crude from the field to Wamsutter, Wyo., a distance of 150 miles. There, the line connects with Standard Oil's transcontinental pipe line.

The pipeline is capable of carrying 20,000 barrels of oil a day from Rangely production. A new pumping station to be powered by two 500 hp. Cooper-Bessemer Diesel pumping units is expected to be ready by the first of the year. At present, oil is being forced into the pipeline by portable gas engines.

Rangely, itself was little more than a wide place in the road before the oil fever hit the vast sun-parched basin early this year. Located 23 torturous miles south of the paved ocean-to-ocean highway 40, the town's population numbered about 50 persons, mostly cow and sheep ranchers, before the oil boom started. Now the area is dotted with oil camps and an estimated 2,500 workers are swarming over the area. New townsites are being staked out and facilities being hurried to take care of the needs of the new population. At present, workers and oil firm representatives are being housed at Verna

Rangely, Colorado, 330 miles west of Denver where major oil companies are developing a promising new oil field.

Utah, just over the Utah border, and at Wiley's Resort and Craig, Colo., 105 miles to the East.

Until the pipeline was built, oil was transported either to Salt Lake City, 215 miles west, or to Craig. Most of the equipment and supplies for drilling comes in by truck from Craig, nearest railroad terminal, on the Denver and Salt Lake Railway.

Water for deep drilling is pumped from the White River near Rangely; water for shallow drilling and domestic use is hauled from artesian wells at Wiley's Resort, located on Highway 40 at the juncture with State Highway 64. Fuel for drilling is supplied in part by oil produced in the field itself and in part by what is trucked into the area.

After a quick gander at Rangely, we began the excruciating ascent over the gravel road back to Highway 40 and headed for Craig. Three miles west of that colorful oil and cattle hub, we saw the blinking lights of the Texas Company's bulk storage plant and refinery. Bud insisted on taking a night shot of the scene.

Craig was bustling the next morning with a steady stream of Diesel transports moving back and forth with supplies and oil. The yards of the Denver & Salt Lake Railway were bustling too with long trains of casing pipe and heavy machinery arriving and being unloaded for Rangely.

At the edge of town, we noticed a tower and discovered it was a new bulk cement plant just erected by the Halliburton Oil Well Cementing Co., of Duncan, Okla., to serve the Rangely boom.

On the loading platform was a brand new Four-Wheel-Drive Cummins Diesel tractor about to depart for Rangely with its custom-built convoy trailer taking on 47,000 pounds of cement which poured into the hatches.

Assembling twin General Motors 6-71 Diesels on Emsco drill rig in the Rangely field.

Ready to be loaded were three other new FWD Cummins units—and the acting foreman, Frank Rose, proudly announced that three more tractors and trailers were promised for delivery in the near future.

The Cummins units are 6 cylinder engines developing 150 hp. and capable of averaging 40 miles an hour under full load over the same grades and washboard that made our Chevvy radiator boil. Bodies of the trailers were built by the Boardman Co., of Oklahoma City to Halliburton's special order. They are equipped with gasoline motors operating hydraulic unloading equipment. Chassis were built by Freuhauf, of Detroit.

Foreman Rose reports the Cummins equipment is doing a marvelous job on the tough grades and curves of the unpaved Rangely road—and too, there are some plenty stiff pulls over the paved Highway 40 between Craig and Wiley's resort, where the cutoff to Rangely begins.

State Highway Department engineers are reported running preliminary surveys for a better highway approach to Rangely, including a possible route that would connect with the transcontinental main line of the Denver and Rio Grande Western Railroad to the south.

Meanwhile, the Interior Department, recognizing the significance of the Rangely oil field, has opened to public leasing for mineral exploration more than 1,350,000 acres of public land on the Utah-Colorado border, near Rangely field. This field, said the department announcement, accentuates "the value of the public land area as a potential new source of petroleum."

INGERSOLL-RAND—HOST

CONTINUING the series of sectional meetings of engineering school representatives inaugurated by D.E.M.A. more than a year ago, Ingersoll-Rand was host to an impressive group of educators at its Phillipsburg, New Jersey, plant on October 20th. The purpose of these meetings is to foster a better understanding between the Diesel engine manufacturers and the engineering schools in their respective localities, looking toward establishment of Diesel engine courses best suited to the manufacturer's needs. In this respect the meeting at Ingersoll-Rand was most successful.

The carefully-planned program, filling an entire day, was opened with appropriate remarks by Harvey T. Hill, executive director of D.E.M.A., followed by a hearty welcome by W. M. Stanton, engineering assistant to the general manager, Ingersoll-Rand. L. V. Armstrong, Assistant Manager, Oil and Gas Engine Department, Ingersoll-Rand, outlined briefly, but pointedly, the history of his company in the Diesel engine field, revealing that Ingersoll-Rand pioneered the now universally accepted practices of solid fuel injection and combustion chamber turbulance also that the company enjoys the distinction of having built the first Diesel-electric locomotive in America—which by-the-way is still doing yeoman service about the plant and was demonstrated to the group on this occasion. Especially interesting among Mr. Armstrong's historical review was the fact that early in the development of the Diesel industry in this country, Ingersoll-Rand licensed Carels Freres, Ghent, Belgium, to build the well-known Price Diesel. Under this license, marine engines were supplied a number of European towing concerns and stationary engines were installed in some 35 foreign countries, showing that American ingenuity contributed materially to early development of the industry in Europe, despite the fact that the Diesel engine itself was a European invention.

A trip through the plant interrupted the morning and afternoon academic sessions. Here the group was shown the Type-S Diesel in various stages of manufacture, assembly and test. The educators found this phase of the program especially helpful inasmuch as Ingersoll-Rand manufactures nearly all of the component parts with the exception of fuel injection pumps, special governors, intake filter-snubbers, piston rings and crank and camshaft forgings which they purchase from outside suppliers. It was interesting to note that a new 6-cylinder engine on the test stand was operating on a fuel rate of .392 lb. which is said to materially improve when the engine bed is properly grouted in. An impressive number of Diesels in process of manufacture were seen.

Included in the company's long list of products seen in process were steam turbines, compressors, turbo-blowers, condensers and pumps. A luncheon which left nothing to be desired in the way of gastronomic delight thoroughly fortified all for the afternoon session.

In his talk on the "Work of the Engineer in the Diesel Engine Division of Ingersoll-Rand," J. F. Male pointed out that design of the engine itself is a mere beginning—that each application involves a thorough analysis of the proposed shaft system and an overall adaptation of engine characteristics to job requirements.

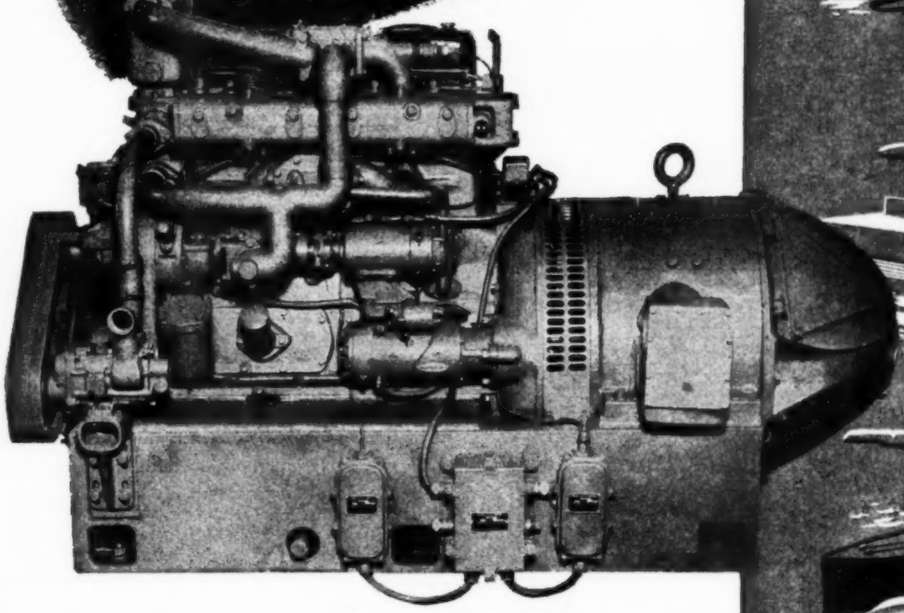
J. B. Hartman, formerly special engineer with Ingersoll-Rand and now instructor in the Engineering School of Lehigh University, spoke on "Vibration Problems in Diesel Engines," pointing out the nature of forces tending to produce vibration and the progress made in solution of vibration problems. Mr. Hartman continues consulting work with Ingersoll-Rand.

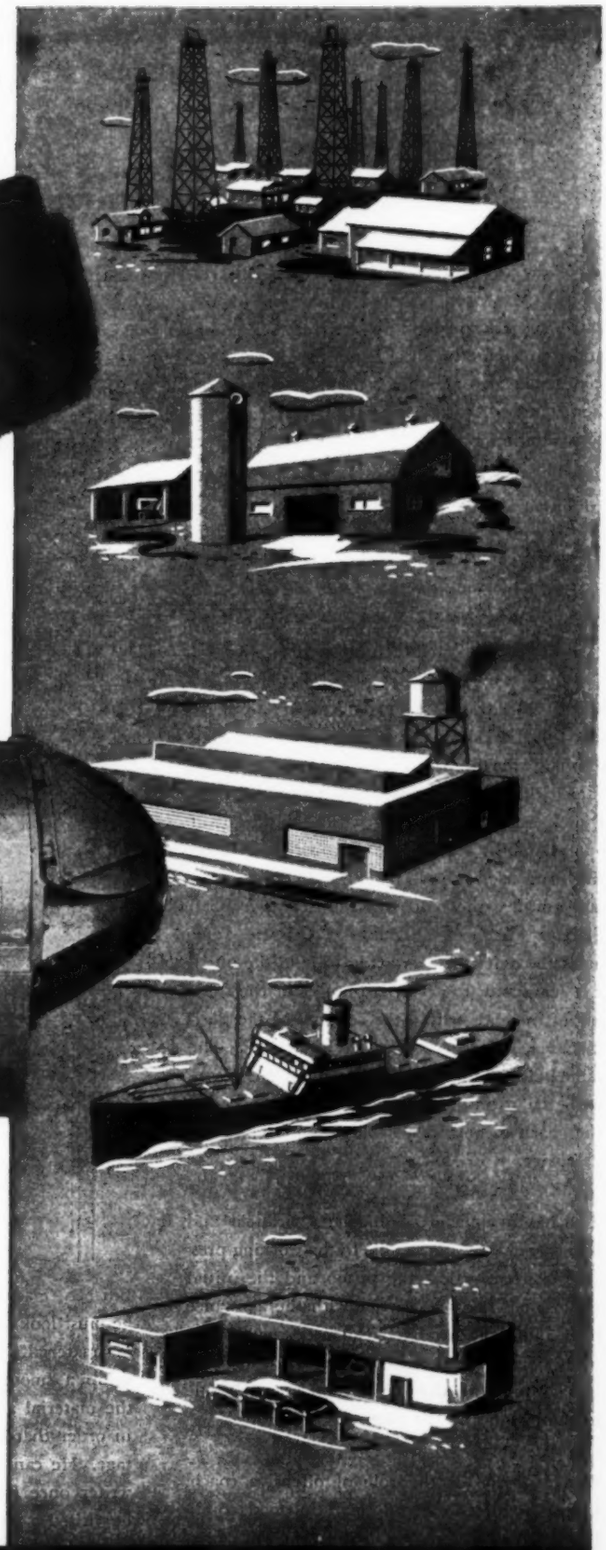
J. P. Hyde, of the Ingersoll-Rand Diesel engineering department, having cut his eye-teeth in building and servicing the earliest Diesel-electric locomotives and having had a hand in the design and development of the Type-S Diesel, spoke at length on "Some Aspects of Diesel Engine Development." Altogether the guests were treated to an unstinted insight into the problems and methods of Diesel engine design, manufacture and operation and all felt they could take back to their classrooms many facts and observations of practical value to their students. Ingersoll-Rand is to be congratulated on its outstanding contribution to this Engineering School Conference Program.

Educators in attendance at this meeting and the schools represented were as follows: Professor H. E. Walter and T. A. Schneider of Newark College of Engineering, Newark, N. J.; Professors A. E. Sorenson and A. D. Hay, Princeton University, Princeton, N. J.; E. A. Michelsen, Rutgers University, New Brunswick, N. J.; Professors W. E. Reaser and E. M. Fernald of Lafayette College, Easton, Pa.; Professor T. E. Jackson and J. B. Hartman, Lehigh University, Bethlehem, Pa.; Professor E. E. Ambrosius, Pennsylvania State College, State College, Pa.; Professor M. G. Carbone, College of the City of New York, New York, N. Y.; Professors H. F. Roemmele and W. A. Vopat, Cooper Union, New York, N. Y.; E. A. Hamilton of New York University, New York, N. Y.; Professor F. S. Egilsrud, Pratt Institute, New York, N. Y., and Professor E. H. Fezandie of Stevens Institute of Technology, Hoboken, N. J.

Group of Engineering School Heads and Professors representing eleven Eastern Colleges and Universities with Ingersoll-Rand Officials who were their hosts at all-day meeting October 20th, last.

Tough Power for Tough Jobs





Superior Model GAB-4 Diesel Generator Set built by National Supply Company, Superior Engine Division, equipped by Auto-Lite.

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When the National Supply Company built this new generator set, they made sure nothing but the best materials and equipment were used. Its starting motor, voltage regulator and generator are built by Auto-Lite. Auto-Lite was specified because of its record of complete dependability—the result of over 30 years' experience in building automotive electrical equipment.

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SUPERVISING & OPERATING ENGINEERS' SECTION

Conducted by R. L. GREGORY*

FACTORS CONTRIBUTING TO OPERATING COSTS——Part 2

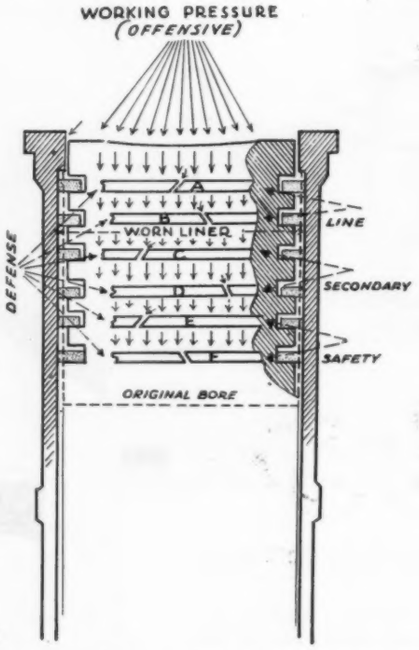
IN the November issue of DIESEL PROGRESS, the writer began a discussion of the above subject and took up the factors of liners and pistons and how the handling of them and maintenance contributed to operating costs. Continuing this discussion the next item for consideration is that of piston rings.

The subject of piston rings is more or less a touchy one with most Diesel men. Most of us have had experiences, some of which have not been too pleasant, on the matter of rings, and after finally battling them out have formed very definite conclusions.

Since most of the readers of this section are more or less familiar with our great game of football, the writer wishes to compare that game with the functions and operation of a Diesel piston and its rings while the unit is in operation. In the game of football, the offensive team tries to push back the defensive team and advance the ball over the defensive goal, thereby scoring a touchdown. On the other hand the defensive team tries to hold the offensive team and stop its line plunges or the skirting of the ends within the confines of the playing area. Strategy is used by both sides. The same holds true in the functioning of the Diesel, with the exception that the engineer becomes the coach of both teams, the offensive and the defensive.

The offensive team of linemen, backfield and ball carrier, are comparable to the working pressure exerted against the piston and the initial explosion. The ball carrier with the assistance of the line and the backfield interference hammers against the defensive team trying to push it back and this defensive team is comparable to the piston and the rings.

The engineer in the role of offensive coach, keeps his injection equipment in good condition so that when combustion takes place, or the ball is passed to the carrier, all the force is exerted against the opposing defense or the piston and rings. At the same time he is also enacting the role of defensive coach by keeping the piston in good shape, grooves and rings clean and arranging them in such a manner that they will hold tight on defense. As the offensive coach uses a certain type of play to advance the ball, the defensive coach sets up a defense. It may be a five-three-two defense, or it may be a seven-three-one defense or any variation of that lineup to stop the offensive play. So the engineer sets up his defense by placing his rings in such a manner that he can best stop blowby or the advance of the ball.



But before a football coach can develop a team he must look over and become acquainted with his material. So, an engineer in order to develop a smoothly operating unit, must know the material and the functioning of each part in order that he can use it to the best advantage. He cannot be in the position which the writer once found a maintenance man, when he visited a certain Diesel plant in the middle west. At the time I visited this plant, they had a unit down and were in the process of cleaning the pistons, ring grooves and heads, preparatory to installing new rings. Being interested in the subject I approached him and inquired as to what make of rings they were using, what life they were getting from the rings and whether they considered they were obtaining satisfactory results from that type of ring. This was his answer: "I have been helping on the maintenance of these units for about six years and we have had to change rings on this particular machine on the average of every four to six weeks. I don't know who makes these rings or what the life of them should be but if you will take a look at that scrap pile out behind the plant, you will find that we have changed a lot of rings in the last couple of years and I get awfully tired of it, as it seems so unnecessary." Well I did look at those rings and after doing so, I certainly agreed with him on the unreasonableness of it. Further conversation however, developed the fact that he had no definite knowledge as to the real function of the rings, and was merely doing a job the "Boss" had ordered done. The "boss" seemed to be in about the same predicament.

As in a football game, each man has definite duties to perform, and in order that satisfactory results can be obtained whether the team is on the offense or the defense, the team must work together as a whole, so must the parts of the Diesel unit work together.

Piston rings may be compared to the defense—they have three main functions to perform. First they must prevent blowby or loss of power by maintaining the working pressure on the piston and preventing it escaping by the piston. Secondly they distribute a film of lubricant along the liner wall, over the area of ring travel thus preventing seizure or scoring, and thirdly in some type of units they act as the agent for transferring the heat of combustion to the liner walls where it is dissipated by the cooling agent in the liner.

The comparison is shown in the sketch, the first two rings representing the defensive line, stopping the initial onrush of the line plunge or working pressure, or preventing the skirting of an end by forming a seal on the liner. If for any reason this working pressure should get either by or through these first two rings then rings "C" and "D" forming the secondary de-

. . . . *And now please turn to page 86* . . . .

* *Chief Engineer, Municipal Water and Light Plant, Hillsdale, Michigan.*

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TO MARK PROGRESS

Exchange Your Diesel Maintenance Ideas

Conducted by **R. L. GREGORY**

Editor's Note: In this department we provide a meeting place where Diesel and Gas engine operators may exchange mutually helpful maintenance experiences to keep our engines in top condition. Mr. Gregory edits your material and adds constructive suggestions from his own wide experience. This is your department—mail your contributions direct to DIESEL PROGRESS.

Opening up Sprays on an Evaporative Cooler

THIS department has received several inquiries relative to removing scale from evaporators, coolers and cooling systems and since the following idea represents the experience of one plant and was submitted by Charles M. Henry of Jacksonville, Illinois we are passing it on to our readers in the hope that it will be of assistance in clearing up such troubles.

"Our evaporative cooler was manufactured by a well known concern and is used by us to cool a 2000 hp. Diesel unit directly connected to a generator. Like most coolers it has a habit of getting clogged in the sprays with scale, dirt, bugs, etc.

"After several sessions of shutting down the unit when it was needed and squeezing, or rather trying to squeeze into a very small space between the spray nozzles (still dripping) and the coils (still hot) and reaching blindly with a pipe wrench to remove the spray heads on the back side of the unit, we came to the conclusion that there must be a more feasible method of doing the job of cleaning these sprays. So we contrived a method whereby they could be cleaned with air.

"This spray system consists of a long 5 inch main header, running the length of the evaporator. Along this main header, at intervals of one foot, are welded ¾ inch pipes, extending at right angles to the main header. From these branch lines or intermediate headers other branch lines are welded. These consist in turn of several short lengths of ⅜ inch pipe at right angles to the intermediate headers. The spray nozzles are screwed on to the end of these short branch pipes.

"We fastened a piece of copper tubing of a size small enough to enter the hole in the spray heads onto our air hose, and about two inches from the outer end of this copper tubing we made a right angle bend. When we discovered a clogged spray head we inserted this tubing into the spray head and turned on the air. After a few blasts of compressed air the dirt or scale was broken up and the spray was again ready for use.

"Occasionally we run into a tough case. To handle these we drill and tap a hole for an ⅛ inch pipe plug in the outer dead end of the intermediate header which enables us to poke a straight piece of tubing clear through the main header to the end of the pipe on the back side. Using the tubing in a manner much as a ramrod is used in cleaning a gun, and giving intermittent blasts of air we are able to open the most stubborn sprays.

"This method of cleaning these tubes and spray heads has saved us the job of practically dismantling the spray system periodically, in order to get it clean, which is a hot dirty job, and a wet one as well. Another advantage of doing the job in this manner is that it can be done while the unit is in operation, and we save the outage time which we were forced to take prior to the use of this method."

Making Use of the Odd Moments

NOW that many contracts are curtailed and many Diesel plants are no longer operated on a twenty-four hour basis, there are a lot of little items around the engine that can be attended to while a unit is out of service for a few hours. One of these situations which doesn't take long to attend to, yet is of importance to operation is the matter of coolers and blowdown lines from coolers. Many units are equipped with intercoolers, wherein the air passing through the various stages of compression is cooled between stages.

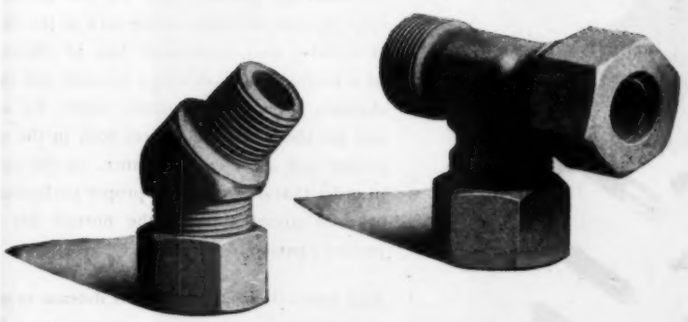
At the bottom of these cooler headers, where the copper coils are attached, there is a blowdown or drain, which the operator occasionally opens to allow the blowing down of that stage and the removal of any moisture or carbon deposits, thus keeping the coils and headers clean for the passage of air. However we have found that no matter how frequently these blowdowns are carried on, a certain amount of sludge and moisture accumulates on the bottom of the drip leg or separator to which the blowdown pipes are attached, and after a period of time the blow down pipe clogs up and the process of blowing down becomes ineffective.

This causes a greater accumulation of sludge and foreign matter in the coils and if not attended to, will eventually cause trouble. If the system is properly piped up, with the blowdown valves installed directly beneath the separator and a union below that, the drain can be easily removed, the separator and blow down pipe cleaned and replaced in a few minutes and the unit assured of being in good working condition.

Another matter is the importance of keeping gauge lines open and free from sludge and accumulations. Most gauge lines are constructed of small tubing, and many of them are of some length. Accumulations of moisture and oils in these pipes eventually make the gauges either inoperative or result in false readings. It is a good practice to disconnect these lines periodically and blow them out with compressed air, blowing them until they are entirely free from foreign matter. If an air source is not available, install a ¼ in. connection on the starting air bottle, using extra heavy pipe and fillings and use this air for the purpose mentioned.

Another item which it takes only a few minutes to look over is the control governor. This should be kept well cleaned and oiled and a few minutes in cleaning and oiling up the parts are well spent. Most of the mechanism in such governors is enclosed in a case and cannot easily be attended to when the unit is in operation.

Meters should be cleaned out occasionally and the piping leading to and from the meters disconnected and cleaned especially where there are numerous fittings in the line, which are required where meter by-pass lines are installed. No matter how clean your fuel, there is bound to be some accumulation of sludge which will adhere to ells, tees and unions and after months of operation, they too will clog up. Spare moments can be used to good advantage in making these little inspections.



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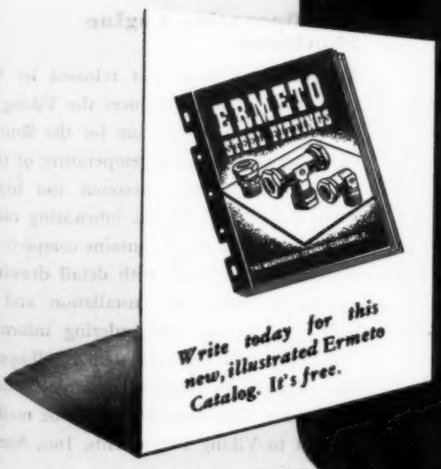

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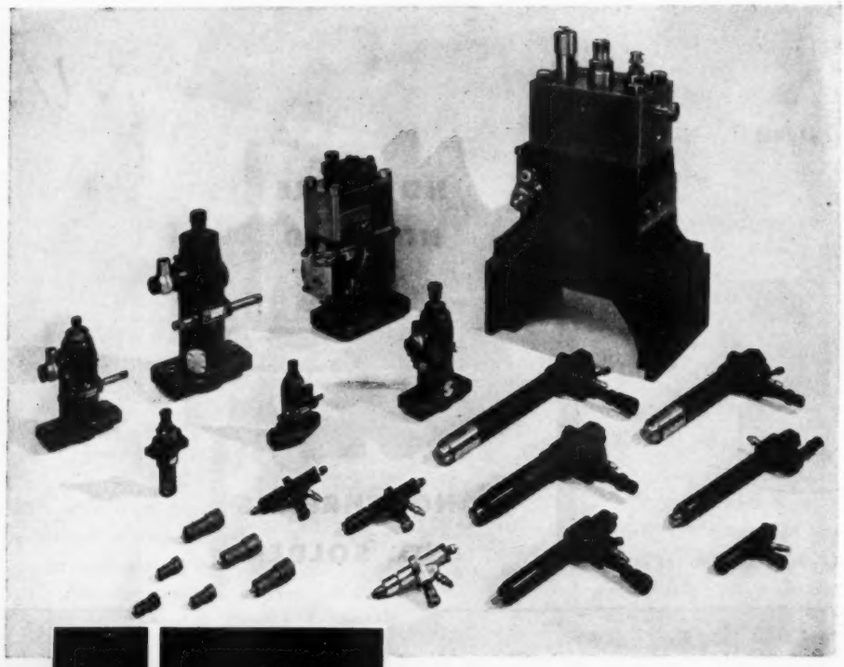

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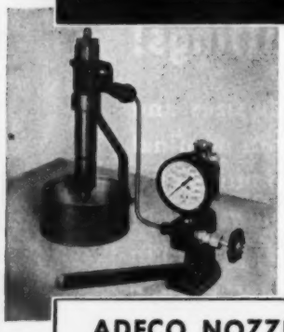

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Supervising: *Continued from page 82*

fense come into action and if for any reason both these lines are pierced, the last two sets "E" and "F" or the safety, tries to block the onrush. And as in the football game if the ball carrier gets by all three lines of defense, trouble for the defensive team ensues. So if the working pressure gets by the defensive rings, trouble develops on the unit in the shape of blowby, and consequent loss of efficiency. As a football coach develops his men and their abilities, so must an engineer study his unit and get the proper tolerances both in the ring groove and as to end clearance, on the rings, in order that they may give proper performance of their duties through the normal life expectancy period.

As a football coach sets up his defense to stop the offensive action, so an engineer must line up his rings to stop blowby and excessive breakage and keep costs down. Excessive breakage of rings and frequent replacements run into money and raise costs, but if the engineer studies the functions of the rings, the materials from which they are constructed and sets them so as to stop excessive loss of power through blowby, he has conquered one of his most difficult problems.

Briggs Appoints Curtis Engine and Equipment Company

THE Briggs Clarifier Company has announced the appointment of Curtis Engine and Equipment Company, 104 Light Street, Baltimore, Maryland as marine products distributor for the Chesapeake Bay area, which includes all Maryland counties bordering the Chesapeake Bay. Widely experienced in marine engineering and the distribution of marine products, George H. Curtis, president of the firm, is thoroughly familiar with filtration and has an intimate understanding of his territory.

Self-Operating Engine ShutDown

DATA Sheet R-18, just released by Viking Instruments, Inc., announces the Viking Type R-18 Safety Control System for the Shut-down of Diesel engines when temperature of the circulating-water system becomes too high, or when there is insufficient lubricating oil pressure. The Data Sheet contains complete information on operation, with detail drawings of general arrangements, installation and operating instructions, and ordering information. The Type R-18 control system is self-operating and requires no electrical power or additional accessories. The Data Sheet will be mailed on request to Viking Instruments, Inc., Stamford, Connecticut.

TUNA! No Time To Waste!

Time is vital to these men. Their job is to get to profitable tuna waters as quickly as possible, devote all their energy to fishing when the run is on, and get back to market with every pound caught. For these days all the fish the industry can produce is needed.

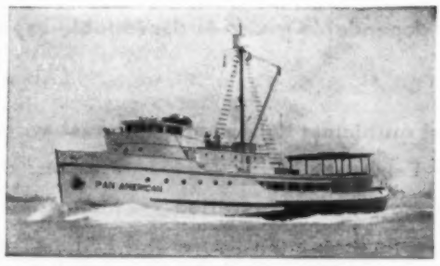
To make a profitable haul, a tuna vessel may have to run all the way down to the West Coast of South America.

Perhaps that's why the designer and well-known Pacific boat builder, Anthony Martinolich, specified Sperry equipment aboard his new super tuna clipper, *Pan American*. He knew that on this long run the fastest time could be made by steering straighter courses.

With the Sperry Gyro-Pilot at the rudder and the Sperry Gyro-Compass in command of the course, the *Pan American* can make her cruise in record time. Not only is *time* saved, there is a double economy—*fuel!*

Besides automatic steering with "Metal Mike," the Sperry Steering System permits hand-electric and emergency-hand steering through shafting and cable. An Electric Rudder Indicator provides a positive indication of rudder position at all times. Two 12-inch Incandescent Searchlights complete the Sperry equipment aboard the *Pan American*.

If you're thinking of new ships, remember that Sperry equipment can help make them more profitable.



The 149' 8" super tuna clipper Pan American, fishing for Sun Harbor Packing Company, of San Diego, has Sperry Gyro-Compass, Sperry Gyro-Pilot, Sperry Steering Engine, Sperry Searchlights, and Sperry Electric Rudder Indicator equipment.

Sperry Gyroscope Company, Inc. GREAT NECK, N.Y.

★

Division of the Sperry Corporation

LOS ANGELES • SAN FRANCISCO • SEATTLE • NEW ORLEANS
CLEVELAND • BROOKLYN • HONOLULU

GYROSCOPICS • ELECTRONICS • RADAR • AUTOMATIC COMPUTATION • SERVO-MECHANISMS

Alnor Multi-point Exhaust Pyrometer

Alnor PYROMETERS

the dependable *guide to* dependable *engine performance*

This successful municipal light plant operates four Fairbanks-Morse Diesels, including a recently installed unit of 1000 hp. As in so many other installations of Diesel engines where dependable performance is paramount, you will find Alnor Exhaust Pyrometers on the instrument board. These reliable pyrometers provide for easy, accurate routine check of exhaust temperatures as a guide to operation, maintenance and adjustment.

Alnor Exhaust Pyrometers are built in a complete range of types and sizes, single and multi-point, to meet the needs of installation with any type of engine, afloat or ashore. Write for special exhaust pyrometer bulletin with complete data.

ILLINOIS TESTING LABORATORIES, INC.
420 NORTH LA SALLE STREET • CHICAGO 10, ILLINOIS

First Post War Tug In New York Harbor— Diesel, of Course

NEW YORK shipping men recently inspected the new 86 ft. harbor tug, *Turecamo Boys*. This is the first postwar-built tug to make an appearance in the New York Harbor. The *Turecamo Boys*, owned by Turecamo Towing Company was designed by Merrit Demerest of New York and built at Jakobson Shipbuilding Company, Oyster Bay, New York. The keel was laid March 15, 1945. This harbor tug is powered with an 8-cylinder, 2-cycle gear drive General Motors Diesel engine, of 800 bhp.

Commenting on this new towboat, George W. Codrington, Vice President of General Motors and General Manager of the Cleveland Diesel Engine Division of General Motors said, "This light weight, high speed engine was employed extensively during the war and is now being used in commercial installations. With this type engine we were able to furnish 200 more horsepower in 10 per cent less space and with 20 per cent less weight than with engines generally used, heretofore, in this size boat."

And Now For Some Diesel Yachts

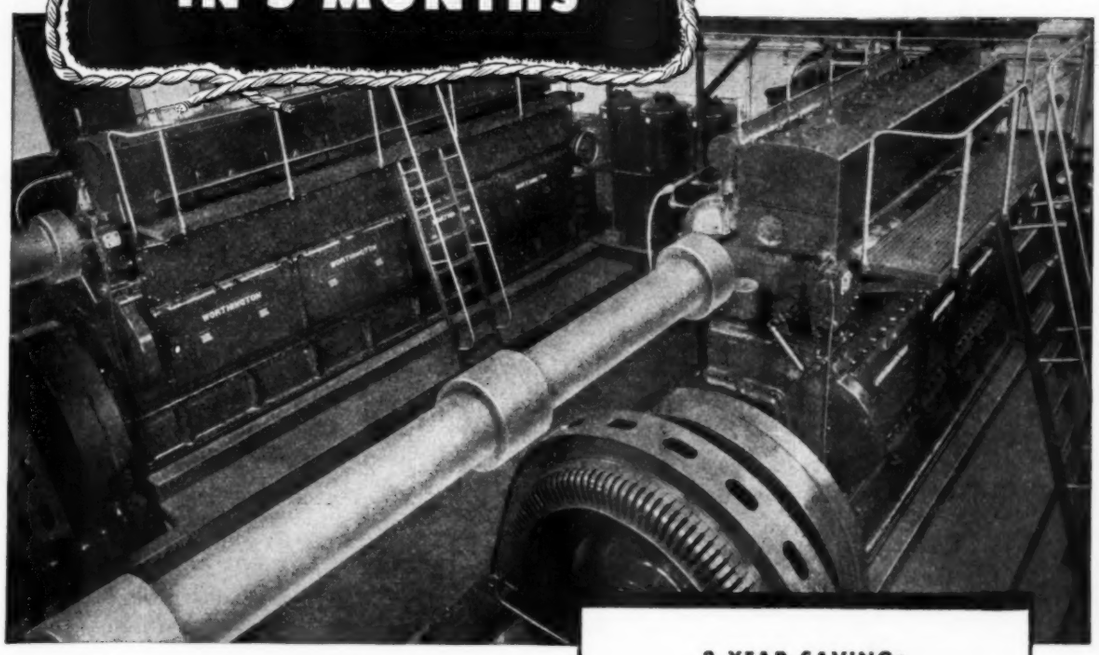
A CONTRACT for the construction of the largest private yacht built in this country since the war has just been given to the Bath Iron Works, Maine, by Major Max C. Fleischmann.

The new vessel, which will be 166 ft. 6 in. in length (overall), 24 ft. 10 in. beam, 9 ft. draft, will be built of steel, and powered with two, straight drive 1200 hp., 8 cylinder Enterprise Diesel engines.

The yacht is designed for long distance cruising and will be especially adapted for cruising on the West Coast, from Alaska to Mexico, and will have all modern conveniences including air-conditioning for both warm and cold climates, special insulation against noise and heat, deck-house controls, long and short wave radio equipment, telephone, Sperry Gyroscope, Radar, etc. Major Fleischmann is well known among yachting circles, having built some 22 different yachts, and is most exacting in his requirements. Plans for the yacht have been drawn by John H. Wells, Inc., Naval Architects of 515 Madison Avenue, New York, N. Y., who will supervise the construction of the vessel. The architects announce that they also have seven boats from their plans now under construction; ranging from 57 ft. to 166 ft. in length. They also have a number of other vessels now in the process of design which will be released for construction as soon as building conditions become more settled.

A 50% SAVING IN 5 MONTHS

. . . Operating Worthington Diesels and Auxiliaries



Hooven and Allison Company, "spinners of fine cordage" since 1869, have tried many kinds of power — manpower, steam power, purchased power, and now, since November 1st, 1940, *Diesel* power.

NO STAND-BY CAPACITY POSSIBLE

Two Worthington engines, a 1000 HP Model EE-8 and a 625 HP Model EE-5 of identical bore, stroke and speed, are required for normal operation. During the first 6 months, both Diesels operated 90% of capacity, 40 hours a week. Today, the larger engine runs 80 hours a week, the smaller 44 hours.

A THREE-YEAR RECORD

Carefully kept records show a total of 7,522,030 Kw Hrs. generated during past 3 years, using 639,297 gallons of fuel oil — an average 11.76 Kw generated per gallon — resulting in the exceptionally good cost record indicated in the "Box Score" on this page.

For *complete* details, further proof that *there's more worth in Worthington*, write *Worthington Pump and Machinery Corporation, Buffalo Engine Division, Buffalo, N Y.*

3 YEAR SAVING: $40,755.01

With a return of more than 4100 Hp. Hrs. per gal. lubricating oil, these two Worthington Diesels operated more than 12,000 Hrs. without stuck rings or hard carbon deposits. Previous power cost: .016¢ per Kw. Three-year average cost with Worthington Diesels: .0105¢ per Kw.

WORTHINGTON

YOUR PARTNER IN POWER PROGRESS

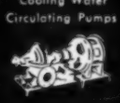
WORTHINGTON-BUILT ENGINES AND AUXILIARIES

Diesel Engines, 150 to 3290 hp . . . **Gas Engines,** 175 to 3500 hp . . . **Dual-Fuel Engines,** 150 to 3290 hp.

Starting Air Compressors

Oil Transfer Pumps

Cooling Water Circulating Pumps



Evaporative Type Engine Water Cooler

RELIABLE . . . readable

EVEN IN THESE *Rough Places*

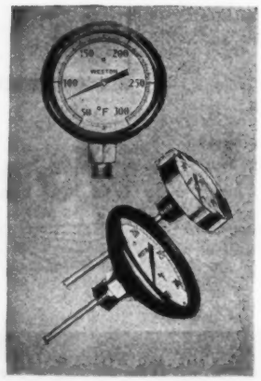
WESTON THERMOMETERS

are ALL-METAL for ALL-ROUND ruggedness!

In tough spots like these, and many others too, *Weston All-Metal Industrial Thermometers* withstand shaking up without breaking down. Even the severe vibrations of pumping units or Diesel engines do not affect the long-term stability of Weston Thermometers.

Basic to their *all-round ruggedness* is an all-metal construction that insures sustained accuracy (within 1% full-scale) over long periods of time. There are no liquids, gases, capillaries or other troublesome parts. Simply an all-metal temperature element safely sheathed in a rugged stainless steel stem.

Weston All-Metal Thermometers are available in scale lengths 6", 9", 12" . . . stem lengths from 2½" to 48" . . ranges from — 100°F to + 1000°F. Literature gladly sent on request . . . Weston Electrical Instrument Corporation, 579 Frelinghuysen Avenue, Newark 5, New Jersey.



Weston *All Metal* THERMOMETERS

British Plan Big Drive in The Diesel Electric Railway Field

AN announcement was recently made that a number of British engineering firms have agreed to pool their research and technical resources in order to present a united front to the world's markets for Diesel-electric rail traction. The firms concerned are Associated Locomotive Equipment Ltd., of London and Worcester, Petters Ltd., of Loughborough, Mirrlees, Bickerton & Day of Stockport, J. & H. McLaren, Ltd., of Leeds, Oil Engines (Coventry) Ltd., Brush Electrical Engineering Co. Ltd., Loughborough, and other members of the Associated British Engineering Ltd., group of companies.

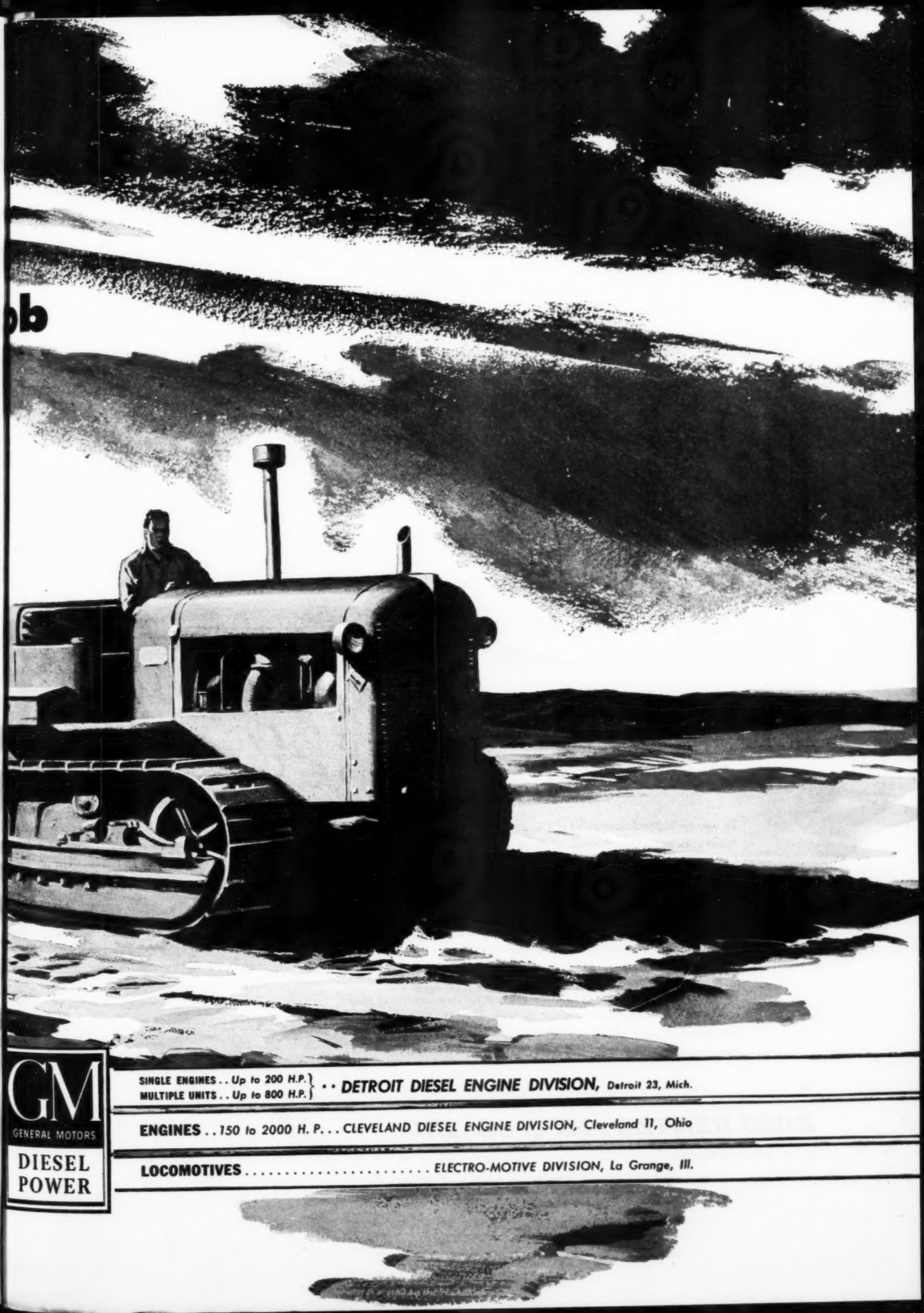
The efforts of all these separate undertakings in the Diesel rail field are being coordinated by Associated Locomotive Equipment Ltd. The group will produce a wide range of components used in the manufacture of Diesel-electric trains, and locomotives including main engines up to 1,500 hp. or more, generators, motors, control and switchgear and all major components of power equipment covering the complete Diesel-electric traction range.

"Diesel-electric trains of the future" said E. W. Marten, B.Sc., A.M. Inst. C.E., M. I. Loco. E., managing director of A.L.E. who will be responsible for the co-ordination of the group's resources "will have a capacity for speed of 100 miles per hour." Generally speaking such trains will be of the multiple unit type, comprising two, three or four passenger coaches permanently coupled, and fitted with their own power equipment. Another vitally important feature of the work of this group will be the production of Diesel-electric shunting locomotives for use not only abroad, but also in Great Britain.

Among the important export orders already received is one for over a quarter of a million pounds, which will include a high speed luxury train capable of 100 mph., incorporating the very latest features devised for comfort and safety at high speeds.

Tube Turns Elects George O. Boomer

GEORGE O. BOOMER, longtime associate of the late Walter H. Girdler, Sr., founder of Tube Turns, Inc., Louisville, Ky., was elected president of the firm at a recent meeting of the board of directors. He was vice president of Tube Turns when Mr. Girdler died suddenly last January. Mr. Boomer succeeds Rudy E. Fritsch, who resigned early in October. Mr. Fritsch will remain with Tube Turns as a consultant, for the present.


GM
GENERAL MOTORS
DIESEL POWER
SINGLE ENGINES . . Up to 200 H.P.
MULTIPLE UNITS . . Up to 800 H.P.
. . DETROIT DIESEL ENGINE DIVISION, Detroit 23, Mich.
ENGINES . . 150 to 2000 H. P. . . . CLEVELAND DIESEL ENGINE DIVISION, Cleveland 11, Ohio
LOCOMOTIVES . . . . . ELECTRO-MOTIVE DIVISION, La Grange, Ill.

Important New Book on Torsional Vibration

ENGINEERS, designers, and research men confronted with torsional vibration problems will find "Evaluation of Effects of Torsional Vibration" a most valuable fundamental treatise on this subject. This 578 p. volume presents the experimental and analytical methods used by research departments of a number of leading Diesel engine manufacturers in investigating and applying means of controlling torsional vibrations. This report was prepared in response to a request from the Navy for the advisory cooperation of the Society of Automotive Engineers.

Besides the introduction, which sets the problems, and conclusions, the bulk of the book consists of the technical treaties which discuss experimental methods used measuring torsional vibration, methods for determining and estimating the significance of nominal torsional stresses, and means for reducing those stresses. The appendix contains, in addition to other material, suggested specifications for torsion vibration equipment which will be of inter to all conecrned with the manufacture and u of these instruments. The appendix also i cludes a contribution from the Navy outlini a suggested form for submission of torsion vibration data to governmental procureme agencies.

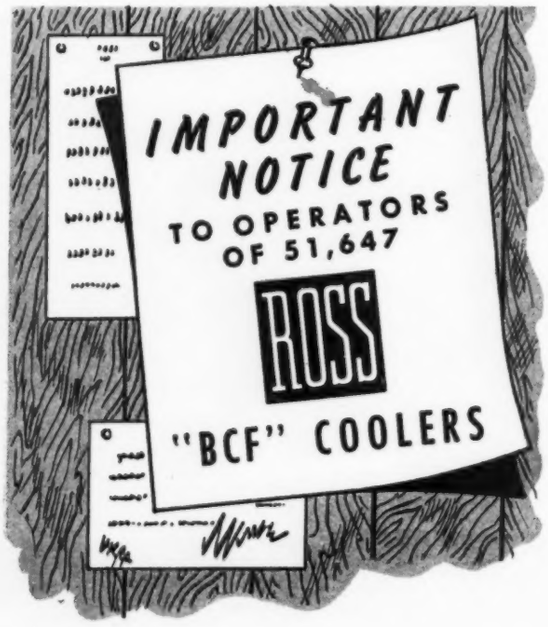
This book contains 576 8½ x 11 pages. includes numerous photographs and 134 f page drawings, charts, and graphs. It is boun in clothboard covers. Price: $5.00 to SA Members, $10.00 to Non-Members. Order fro Special Publications Department, Society Automotive Engineers, Inc., 29 West 39th Stree New York 18, N. Y.

SKF Publishes Book On Bearing Engineering

A 270-PAGE technical book entitled "Ball an Roller Bearing Engineering" has been pub lished by SKF to serve as a fundamental text o all phases of bearing applications in industry The book, a bound volume containing som 900 drawings and tables, begins with a technic description of common bearing types and con tinues through nine chapters of fundamenta engineering studies. Both radial and thru bearings are discussed comprehensively in Cha ter I together with data on dimensional pro portions, running accuracy and tolerances o each type.

"Forces and Motions in Bearings," the secon chapter, is devoted to theory and calculation on such subjects as the nature of rolling re sistance, friction torque, friction coefficient stresses and deformations, load distribution motion and inertia. Other chapters deal wit studies in the carrying capacity of ball an roller bearings, bearing selection, design o bearing applications, mounting and dismount ing, lubrication and maintenance and bearing failures. The final chapter is made up of table conversion values and a description of symbol Dr. Arvid Palmgren, author of "Ball and Roller Bearing Engineering," is an authority in hi field. Winner of engineering academy award for his research in bearing fatigue phenomen and the development of methods of calculating their life, Dr. Palmgren has spent nearly 3 years in his field of bearing engineering.

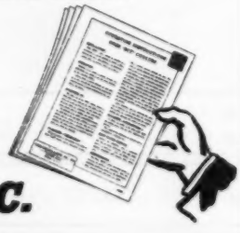
First copies of the book will be sent by SKF to the heads of leading corporations, technical schools and colleges and libraries in principl U. S. cities. Later editions will be sold at cos by the company for students and others inter ested in bearing studies.



To assure highest operating efficiency with minimum performance interruptions, all operators of Ross Type "BCF" Lube Oil and Jacket Water Coolers should have on file a copy of *Operating Instructions and Spare Parts.*

Boiled down into two pages of essential, helpful information, this instruction sheet offers valuable pointers on chemical and mechanical cleaning, inspection and a simple method of ordering spare parts when necessary.

There is no charge—no obligation for this service, which is made available by Ross engineers in the interests of conservation and efficiency of "BCF" Coolers. Just request SHEET E. D. S. E-27-125-0.



ROSS HEATER & MFG. CO., INC.

Division of American Radiator & Standard Sanitary Corporation

1425 WEST AVENUE BUFFALO 13, N. Y.

Ross equipment is manufactured and sold in Canada by Horton Steel Works, Ltd., Fort Erie, Ontario

There's no need today of taking chances when placing your order for the precision manufacture of quality parts. We know what our large force of craftsmen and experienced engineers can do—they proved it time and time again during the past war crises—they are proving it today in the mass production of precision parts. Remember, the symbol and guarantee of precision manufacture is Lawson! Call or wire us today—there's no gamble when you do business with Lawson.

This stainless steel aircraft valve involves 32 operations, including thread grinding, cutting 36 serrations, various close milling and drilling operations.

PRECISION *Lawson*

ARMY E NAVY

LAWSON MACHINE and TOOL CO.

120 MOUNTAIN AVENUE, MALDEN 48, MASS.

Resolution Passed at a Meeting of the Board of Directors of the Diesel Engine Manufacturers Association, Thursday, October 18, 1945

WHEREAS, in a number of engineering schools in the United States there were installed by the United States Navy during World War II, Diesel engines, Diesel engine parts, testing equipment, tools, charts, booklets and other instructional material for the purpose of training students to operate and maintain Diesel engines; and

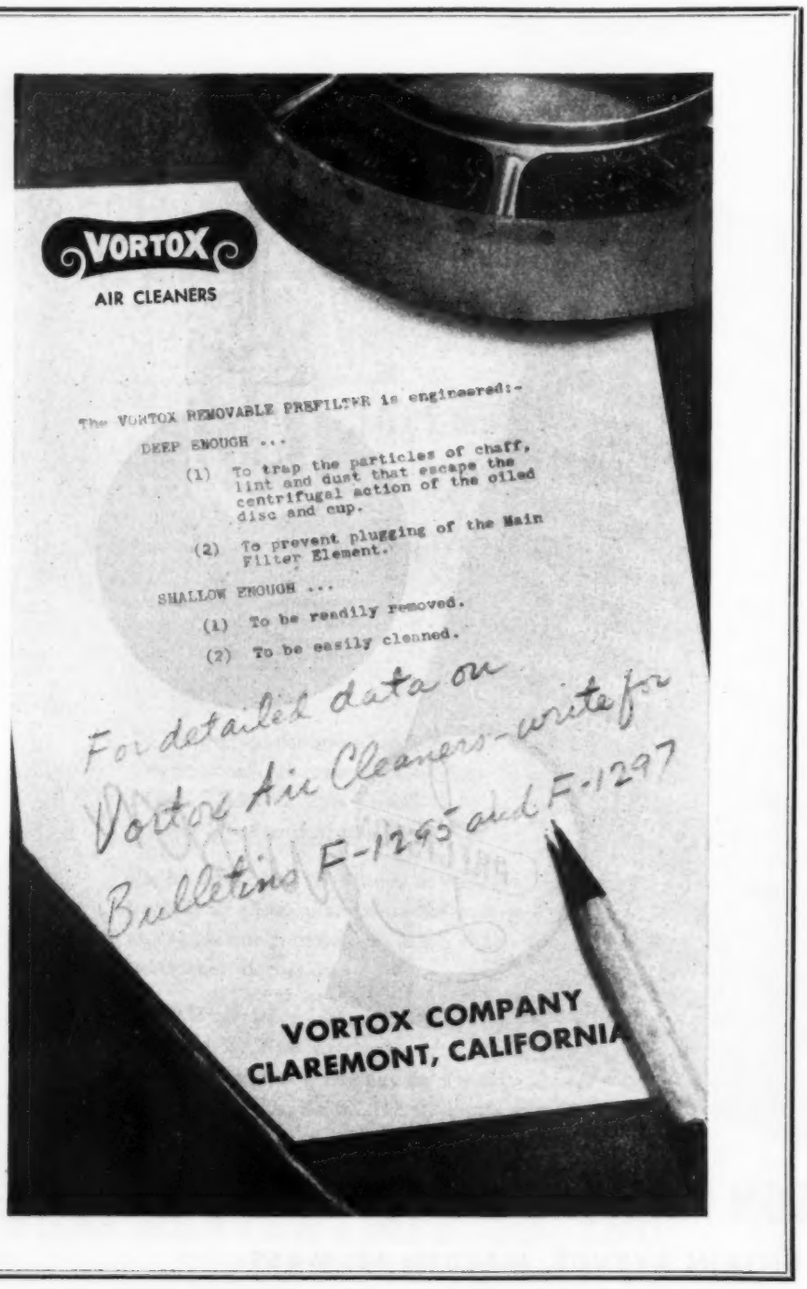
WHEREAS, with the coming of peace the immediate need for such men to operate and maintain Diesel engines in the armed forces does not now exist, but will again arise in times to come; and

WHEREAS, there is now and always has been a real dearth of competently-trained Diesel engineers to design, build, install, test, operate and maintain Diesel engines for the country's railroads, ships, factories, mines, trucks, buses and construction machinery; and

WHEREAS, the best place for training such engineers is in the accredited engineering schools of the country, into a number of which the United States Navy has placed modern Diesel engine training equipment as described; and

WHEREAS, such training equipment installed at considerable expense but now classed as second-hand, is not needed for civilian industry since (1) Diesel engine manufacturers are now well prepared to fill all orders for their product, and (2) the armed forces have declared as surplus property a goodly number of wartime Diesel engines:

NOW, THEREFORE, BE IT RESOLVED, That such engineering schools of the United States which now have Diesel engines and Diesel engine instructional equipment provided by the United States Navy and which have real need and a definite plan for their use as training equipment, be permitted to keep them for this purpose, and for the purpose also of providing an established setup for training Diesel engineers for the armed forces of the United States whether or not our country should again become involved in war.


VORTOX
AIR CLEANERS
The VORTOX REMOVABLE PREFILTER is engineered:-
DEEP ENOUGH ...
(1) To trap the particles of chaff, lint and dust that escape the centrifugal action of the oiled disc and cup.
(2) To prevent plugging of the Main Filter Element.
SHALLOW ENOUGH ...
(1) To be readily removed.
(2) To be easily cleaned.
For detailed data on Vortox Air Cleaners-write for Bulletins F-1295 and F-1297
VORTOX COMPANY
CLAREMONT, CALIFORNIA

Morse Chain Appoints Ray P. Johnson

FRANK M. HAWLEY, vice-president and general manager of the Morse Chain Company, division of Borg-Warner Corp., recently announced the appointment of Ray P. Johnson to be assistant to the general manager with offices in Detroit. Mr. Johnson assumed his duties Nov. 1, rejoining the Borg-Warner Corp., of which he has been a director since 1936. He left the organization to enter the Army more than three years ago.

New Five-range Tachometers

THE Herman H. Sticht Co., Inc., has just released bulletin No. 750 which describes the new Universal Type Hand Tachometer, Type U, with five ranges imported from Switzerland.

These tachometers have wide range, and unusual readability as the over-all range is broken down into five special ranges with readability as close as 1 rpm. per division. Instruments are small in size with a three-inch dial and fit neatly into the palm of the hand. The tachometers are non-magnetic, of the centrifugal type, direct reading, well damped, which cuts out oscillations.

A copy of bulletin No. 750 will be mailed on request to Herman H. Sticht Co., Inc., 27 Park Place, New York 7, N. Y.

QUESTION:

Can oil from which additives have been removed, be successfully re-used?

ANSWER:

YES, AND WE CAN PROVE IT!

QUESTION: ***But Aren't the Additives Needed to Prevent Varnish?***

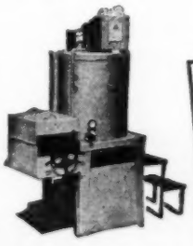
ANSWER: *The additives confer valuable anti-varnish properties. But it's been proved that oil cleaned in a YM Oil Refiner acquires remarkable anti-varnish characteristics—even though the additives are removed in the process.*

QUESTION: ***Can YM Treated Oil Remove Varnish?***

ANSWER: *Oil treated in a YM unit can remove existing piston varnish, as well as prevent its recurrence. In specific cases, this can be guaranteed—without requiring engine adjustments or a change to another brand of lube oil.*

QUESTION: ***Can YM Treated Oil Prevent Sludge Deposits?***

ANSWER: *YM treated oil can both remove existing sludge deposits and thereafter prevent their formation.*



QUESTION: ***How About Fuel Dilution in the Oil?***

ANSWER: *The YM Oil Refiner removes fuel dilution, as well as moisture (even if emulsified) by heating before filtration. Two-stage filtration removes solid contaminants and asphaltic materials. YM treated oil is aged and therefore more stable.*

QUESTION: ***What Success Do Other Users Report?***

ANSWER: *If you'll mail the coupon below, we'll be glad to send you names of satisfied users of the YM Oil Refiner in your locality—as well as further information about the unit itself.*

The Youngstown Miller Company
1212 Kidde Avenue, Belleville 9, N. J.

Gentlemen:
Please send me further details about the YM Oil Refiner—and names of users in this locality.

Name_____

Position_____

Company_____

Street Address_____

City and State_____

THE YOUNGSTOWN MILLER COMPANY
A Subsidiary of Walter Kidde & Company, Inc.
1212 Kidde Avenue, Belleville 9, New Jersey

GMC Truck & Coach Announces Plans for Expansion Program

GROUND has been broken for a new coach assembly plant marking the first step in a modernization and expansion program at the factories of GMC Truck and Coach Division.

The entire program, which will add 1,500,000 square feet of floor space to GMC's present plant facilities, includes three major building projects: An assembly plant for production of GM cruiser-type coaches; an engine plant for manufacture and assembly of GMC engines; and a new engineering building for experimental work. Work has already been started on the new coach assembly plant, and it is expected to be completed around December 15, 1945. Work on the other buildings will be pushed as rapidly as possible.

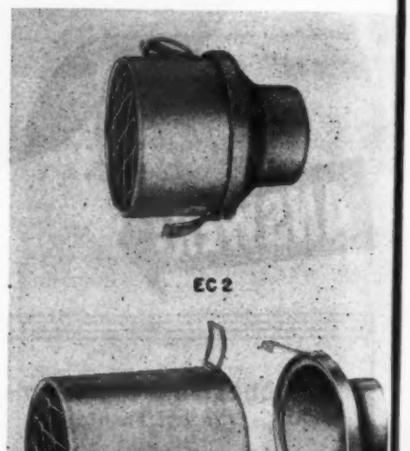
This extensive modernization and expansion program will provide facilities for the greatest commercial truck production in GMC history and will make possible an annual GM coach volume double that of the best previous sale year. The General Manager, M. D. Dougla pointed out that GMC expects to exceed pr war truck production levels by the end of 19 and anticipates an all-time high in GMC truc production in 1946.

You'll find the qualities you want
AT
"CHICAGO SCREW"
Our experience in manufacturing new, or unusual intricate screw machine products, in a minimum of operations, with great precision, and at reasonable cost, is available to you. Our organization is well qualified to give you the finest in screw machine craftsmanship.
THE CHICAGO SCREW CO.
ESTABLISHED 1872
1026 So. Homan Avenue Chicago 24, Ill.

Far-Air Filters

A NEW type of air filter, originally designe for railroad service, is now available for quic installation on air compressors of all type small internal combustion engines and any m chinery requiring air filter equipment, accor ing to the Farr Company, manufacturers. Ide tified as the Far-Air EC filter, it will be ma up in diameters of from 7 in. to 14 in. wi capacities from 90 cfm. to 730 cfm.

As illustrated, the complete unit is compos



Far-Air Filters

of the filter element enclosed in a cylindri steel housing, and a cast iron adapter base. T filter element is of the same herringbo crimped screen design used in Far-Air ven lating filters, permanent and easily cleaned. is spirally wound into a 2 in. pack and, f average service conditions, the filter conta two of these packs.

Filter units can be cleaned with high press hot or cold water, or by agitating in a tank any good commercial cleaning solvent. O cleaned, they should be dried and re-oiled b fore reinstalling. Full information and en neering data about EC filters and other Far- products is available from the Farr Compan 2615 Southwest Drive, Los Angeles, Californ

TOCCO ... the sign of

5 TO 10 TIMES LONGER LIFE

AN engine's crankshaft is its *sinew of power*. Is it any wonder that engine builders pay strictest attention to this vital part . . . for utmost wearability and strength?

Millions of crankshafts, surface hardened by TOCCO Electrical Induction, are contributing to the stamina of the above makes of engines . . . lasting 5 to 10 times longer than shafts which are not surface hardened.

One of these manufacturers reports locomotive service records of 1,000,000 miles—the equivalent of 40 times around the world—with only .001″ wear on a TOCCO-Hardened crankshaft . . . Another reports only .0025″ wear after 230,000 miles of gruelling trucking service.

TOCCO-Hardened crankshafts give this kind of service because:

TOCCO hardens the *wearing surface* only . . . does not affect the shaft core. Hence:

It produces *superhardness* for greater wear resistance and . . .

It preserves the previous *strength and ductility* to withstand higher pressures and speeds.

Similar stamina and performance can be expected from TOCCO-Hardened parts of all kinds. Find out how you can *improve your products and cut your costs* with TOCCO Induction Heating. New book of case studies, free on request. Ask for Bul. 14.

THE OHIO CRANKSHAFT COMPANY, Dept. DP • Cleveland 1, Ohio

TOCCO

INDUCTION

HARDENING, BRAZING

ANNEALING, HEATING

Woodward Wins Recognition Flag For Accident Prevention Record

FOR an outstanding accident prevention record—1,311,000 man hours without a lost time accident—Woodward Governor Company now flies the coveted Safety Flag of Liberty Mutual Insurance Company. This flag is awarded only to concerns whose achievement in preventing accidents is exceptional, and this is the first presentation to a Rockford organization.

President Irl C. Martin, accepting the flag for all members of his concern from R. C. Foster, Liberty Mutual Servicing Engineer, praised the workers for the fine job they have done and urged them to carry the same principles of safety into their homes and with them on the highways. Mr. Foster then told all present why their record is considered so important to his company and urged them to join with other "experts" in helping reduce accidents across the country.

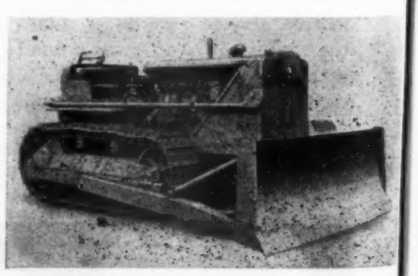
"This flag," he asserted, "honors you for your part in making this a safe place to work—a distinction won by the full teamwork of all members of your company. You are better workers because you are safe workers. We hope you will take great personal pride in this flag you have helped raise to your masthead."

Diesel Engine Catalog

THE 1945 Edition of the DIESEL ENGINE CATALOG, Volume 10, is ready for distribution. It is the largest edition yet published—532 pages, hundreds of illustrations—a *Composite Catalog* of the *Entire Diesel Industry*. Page size 10⅛ in. x 13½ in.—a big book and a real value. A separate section devoted to each manufacturer's line of engines with completely illustrated descriptions and specifications—covering stationary, marine, automotive and railway types. Other sections cover Diesel accessories such as fuel injection equipment, chain and gear drives, electric, hydraulic and mechanical couplings, superchargers and many other items. Also contains a directory of products and manufacturers. An indispensable book for all interested in Diesels. Paper restrictions limit the supply so order your copy promptly—a convenient coupon will be found on page 109 of this issue.

Caterpillar Bulldozers and Scrapers Now in Production

"CATERPILLAR" cable-controlled bulldozers and scrapers, announced as an addition to the company's line of products more than a year ago, are now in production as the result of a lifting of WPB restrictions, it is announced by Caterpillar Tractor Co. Delivery of bulldozers for "Caterpillar" Diesel D8, D7 and D6 track-type tractors is scheduled late this year, with delivery of the scrapers in several sizes scheduled for early 1946.



Caterpillar Diesel Tractor and Bulldozer

The new products, which have been subjected to thorough testing on the company's proving grounds and at numerous locations throughout the United States, will be sold and serviced through "Caterpillar" dealers, making it possible to provide the customer with a complete "package" of machinery for earthmoving needs

IT'S NEW
HELIXHAUST
WATER-COOLED
MANIFOLD
FOR MODERNIZING YOUR 4 CYCLE DIESEL
BY TURBO SUPERCHARGING
This is what's inside! Helical baffles make four independent exhaust passages
● Helixhaust water cooling reduces temperature of exhaust gasses and protects turbocharging. Makes engine room livable. Increases permissible supercharged rating of Diesel engine. It's simpler, neater, more attractive than any other . . . and it's competitive in price. These are only a few of the reasons why you should install Helixhaust Water-Cooled Manifolds. Write Stewart for more information about this efficient manifold as well as Intake Manifolds, Water Inlet Headers, and Water Discharge Pipes.
One half of a 4 passage Helixhaust for 8 cylinder Diesel.
FABRICATED BY STEWART
Stewart
FABRICATORS OF
IRON · STEEL · WIRE
THE STEWART
IRON WORKS CO., INC.
1281 Stewart Block
Cincinnati, Ohio

A COMPOSITE CATALOG OF THE ENTIRE DIESEL INDUSTRY

More than **300** *American-made Diesels described*

PROFUSELY ILLUSTRATED

Alco Diesels for Universal Application
Alco Stationary Diesels
Alco Sulzer Diesels
Anderson Model KD
Atlas Imperial Stationary Diesels
Atlas Imperial Industrial Diesels
Atlas Imperial Marine Diesels
Atlas Lanova Diesels
Baldwin Model VG Diesels
Baldwin Model VO and VM Diesels
Baldwin Series 10 Diesels
Buckeye Model "70" Diesels
Buckeye Series "80" and "90" Diesels
Buda-Lanova General Purpose Diesels
Busch-Sulzer Bros. 2-cycle Diesels
Busch-Sulzer Bros. 4-cycle Diesels
Caterpillar Automotive Diesels
Caterpillar Industrial Diesels
Caterpillar Marine Diesels
Chicago Pneumatic Models 8 and 9 CP
Chicago Pneumatic Type 16-CP
Chicago Pneumatic Type 112 and 114 CP
Chrysler Industrial Diesels
Chrysler Marine Diesels
Clark Bros. Convertible Gas Diesels
Clark Bros. Models SD and MD
Cleveland Diesel Div. G.M. Models 268A and 278A
Climax Models D 148 and D 297
Cooper-Bessemer Types GS, FV and EN
Cooper-Bessemer Type JS
Cooper-Bessemer Type LS
Cummins Model A Diesel
Cummins Model H and HS
Cummins Model L and N
Cummins Fuel Injection System
Detroit Diesel Div. G.M. Series 71 Diesels
Dodge Lanova Diesel
Electro-Motive Div. G.M. Model 567
Enterprise Standard & Supercharged Diesels
Fairbanks-Morse Model 38, "OP" Diesel
Fairbanks-Morse 2-cycle Types 33 and 37
Fairbanks-Morse 2-cycle Model 32
Fairbanks-Morse 2-cycle Model 35
Fairbanks-Morse 4-cycle Model 36
Fulton Iron Works Co. Models RR, BGS and KS
Gray Marine Diesels
Hallett Diesels
Hamilton Double Acting Diesels
Hamilton Single Acting Diesels
Joshua Hendy Series 50 and 20 Diesels
Hercules Automotive Diesels
Hill Model R. Diesels
Ingersoll-Rand Type "S"
International Tractor and Industrial Types
Kahlenberg Marine and Stationary Diesels
Kermath 4-cycle Marine Conversions
Lathrop Types D-50 and D-80
Lister-Blackstone Models CD and CE
Lorimer Slow Speed Heavy Duty Diesels
Mack-Lanova Trucks, Bus and Marine
Murphy Marine Diesels
Murphy ME Series Diesels
Nordberg Convertible Diesel-Gas Engines
Nordberg 2-cycle Diesels
Palmer Bros. Type RND
Rathbun-Jones Diesel and Gas Engines
John Reiner Diesel Marine Auxiliary Units
Sheppard Models 6 and 7, 12 and 13
Sterling Viking Diesels
Superior (National Supply Co.) Models A and D
Superior (National Supply Co.) Types M and S
Union Marine and Stationary Diesels
United States Motors Diesel-Electric Plants
Venn-Severin Model HC
Venn-Severin Model HCV
Venn-Severin Model M
Washington Industrial and Marine Diesels
Waukesha Hesselman Industrial Type
Waukesha Multi-fuel Oil Engines
Witte Diesels and Diesel Electric Plants
Wolverine 2- and 4-cycle Diesels
Worthington 4-cycle Diesels
Worthington Models BB, CC, DD, DH, EE and EH

Equipment Described

Adeco Fuel Injection Equipment
American Bosch Fuel Injection Equipment
Demco Fuel Injection Equipment
Bendix Scintilla Fuel Injection Equipment
Ex-Cell-O Fuel Injection Equipment
American Blower Hydraulic Couplings
Durabla Pump Valve Service
Diamond Chain Drives
Link Belt Chain Drives, Couplings, Speed Increasers
Morse Chain Drives and Couplings
Roots Connersville Supercharging Blowers
B-W, formerly McCulloch, Roots-Type Superchargers
Elliott (Buchi System) Turbochargers
Elliott Electromagnetic Slip Couplings

$10

USE THIS COUPON

DIESEL ENGINES, INC.—Two West Forty-Fifth Street—New York 19, N. Y.

Enter my order today for a copy of the New Diesel Engine Catalog, Volume Ten, Edited by Rex W. Wadman, for which I enclose $10.00.

NAME: .....

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Twin Disc Names Adamson Vice President; Other Personnel Changes Are Announced

THE election of N. F. Adamson as vice president in charge of sales and engineering of the Twin Disc Clutch Company, has been announced by P. H. Batten, president of the company. Mr. Batten also announced the following additional personnel changes: E. C. Billings has been named sales manager of the Racine division. Roger G. DeLong has been appointed sales manager of the hydraulic division, with headquarters at the company's Rockford, Illinois, plant. G. W. Buelke has been appointed chief engineer of the Racine division.

The purpose of the new appointments, according to Mr. Batten, is to provide a closer coordination of engineering, sales and service activities in the Racine and Rockford divisions, and to make closer contact possible between the main offices and users of Twin Disc Clutches and Hydraulic Drives, supplementing the regular contacts made by personnel of the company's district offices.

N. F. Adamson

Mr. Adamson, who has been general sales manager for the past two years, has been associated with the Twin Disc Clutch Company for more than two decades. He was chief engineer for many years, and prior to that time worked with the sales and engineering departments.

Marine BUCKEYE Stationary

DIESEL ENGINES

are PROTECTED 24 Hours a Day by this ALERT (SILENT) WATCHMAN

Your investment in a Buckeye Diesel is protected every operating minute by the patented "Silent Watchman," an important feature exclusive with Buckeye.

If either oil or water supply drops below the predetermined pressure necessary to serve the engine the Silent Watchman cuts off the fuel supply *at the nozzles*, immediately stopping the engine—preventing possible costly repairs.

The Silent Watchman goes into action **INSTANTLY** if—

1. Lubricating oil pressure is too low.
2. Quantity of lubricating oil in the system is insufficient.
3. Lubricating oil is too thin.
4. Water in cooling system is insufficient.
5. Water circulation stops.
6. Bearings are too loose.

Stationary and Marine Propulsion (Direct Reversing) Engines 150-*900 H.P.

There are eleven other outstanding Buckeye features that mean much to users of Diesel power.

Write today for bulletins.

Stationary and Marine Auxiliary Generator Sets 100-*600 KW

*Supercharged ratings to 1440 H.P. and 1000 KW.

THE BUCKEYE MACHINE CO. — LIMA, OHIO

• ENGINE BUILDERS SINCE 1908 •

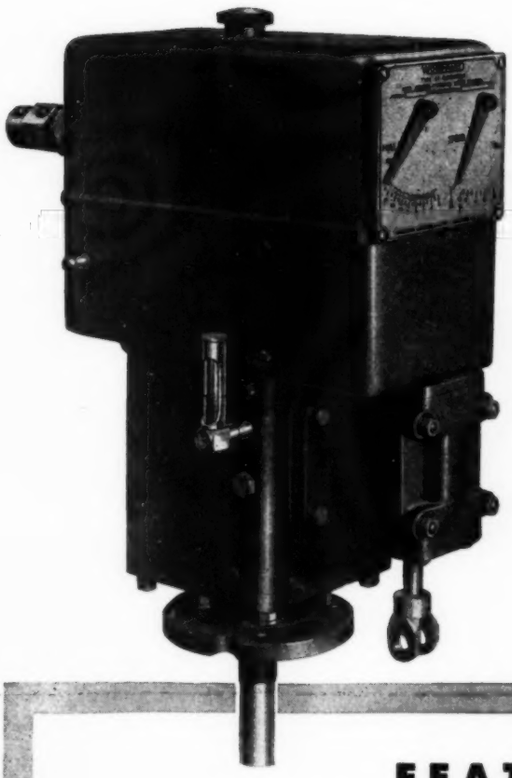
Booklet on LeTourneau Tractor Equipment

DESIGNED to assist equipment owners and operators in selection of proper tractor tools, a new eight-page folder describing the full LeTourneau tractor equipment line is just off the press.

The folder describes and pictures the various current models of LeTourneau Carryall Scrapers, Tiltdozers, Rooters, Cranes, and Power Control Units. Its many on-the-job photos show each type of equipment in different applications, which are accompanied by explanations of job-proved operating methods. A copy of this new folder, Form G-1068, may be obtained from any LeTourneau Distributor, or by writing directly to R. G. LeTourneau, Inc., Peoria, Illinois.

Charles T. Evans, Jr., Appointed Chief Metallurgist of Elliott Co.

THE appointment of Charles T. Evans, Jr., as chief metallurgist for the Elliott Company is announced by R. B. Smith, engineering vice president. Evans, formerly manager of the carbide department of the Titusville plant of the Universal-Cyclops Steel Corp., has been concerned with the development of high temperature resistant steels for application to high-temperature steam and refinery valves, turbochargers, jet and rocket propulsion equipment. Another of his developments was a method for



WOODWARD

Presents

A NEW TYPE SI GOVERNOR FOR MODERN AND IMPROVED DIESEL ROAD AND SWITCHER LOCOMOTIVES

FEATURES

1. Rugged construction.
2. Tamper-proof safety features and adjustments.
3. Simplifies adjustments for speed and load by incorporating them in the governor.
4. Eliminates control auxiliaries by incorporating them in the governor.
5. Electro-hydraulic control with up to fifteen speed stops plus shutdown position can be supplied for use with electric cab control supplied by the locomotive builder, or
6. Pneumatic hydraulic control with variable speed over the entire range, including shutdown, can be supplied for use with pneumatic cab control supplied by the Woodward Governor Company.
7. Engine can be protected by connecting safety devices to shutdown or reduce speed setting through protective auxiliaries in the governor.
8. Governor operating characteristics can be adjusted to suit desired engine performance.
9. This design is based on 12 years actual experience with the basic type SI Governor on all types of engines for various services.

WOODWARD GOVERNOR COMPANY
WORLD'S OLDEST AND LARGEST MANUFACTURER OF HYDRAULIC GOVERNORS FOR PRIME MOVERS
ROCKFORD, ILLINOIS

providing tungsten carbide bullet cores which, mounted in shells, were effective in stopping German tanks.

One of the active organizers of the Northwestern Pennsylvania chapter of the American Society of Metals, Evans has, since 1941, served as a member of the National Advisory Committee for Aeronautics. In his new assignment he will be responsible for the metallurgical problems of the whole Elliott Company, with particular attention to the metallurgical aspects of research and production of gas turbines.

Easier Cleaning for the Marine Industry

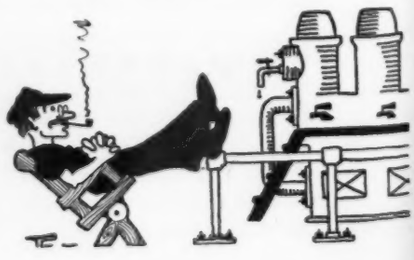
A NEW bulletin carrying the above title has just been issued by Kelite Products, Inc. The bulletin illustrates and describes quick, easy methods of cleaning ship's machinery, hulls, galleys and of degreasing tanks, paint stripping and descaling. It also shows how the time required for complete overhaul cleaning of Diesel engines may be reduced from 1½ days to 3 hours. There are thirty different cleaning compounds and processes for special services listed. A copy of the bulletin will be mailed to those interested on request to Kelite Products, Inc., P. O. Box 2917, Terminal Annex Station, Los Angeles 54, California.

The New Evans Thermo-Control Fan

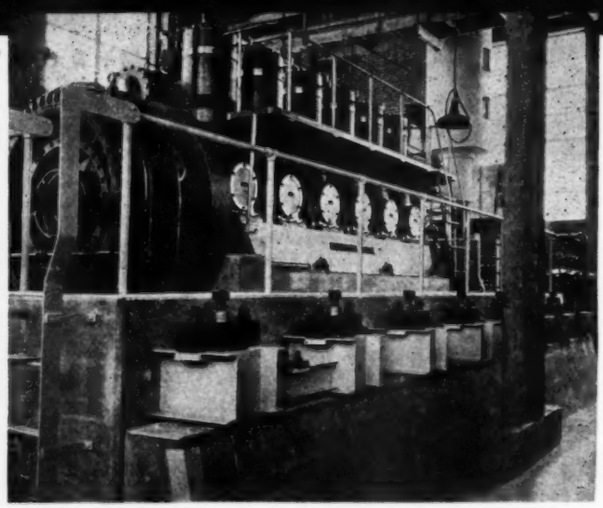
THE new Evans thermostatically-controlled fan is designed for application on heavy duty equipment, such as buses, trucks, stationary engines, tractors, shovels and Diesel locomotives. When the engine says "Give me more air!", this variable pitch fan responds the exact degree required to maintain correct engine temperature. The Evans Thermo-Control Fan adjusts itself, automatically, to Arctic cold or to the heat of Death Valley, to cold mornings or to heavy loads on warm days. More uniform temperature distribution throughout the engine compartment is accomplished because the Thermo-Control Fan does not introduce excessive cold air around the engine.

Evans Thermo-Control Fan

The Evans Thermo-Control Fan automatically adjusts itself to produce economical operating conditions, by means of variable pitch control of the fan blades. This is accomplished by a built-in, heavy duty Vernatherm Thermal power element. With the engine at low load or on cold days, the fan blades might be at zero pitch or reverse pitch. The Vernatherm automatically changes the pitch of the fan blades, through infinite variation, to the maximum which would be required under heavy loads or extremely high ambient temperature.



Consider KORFUND Vibration Control *First*



Fairbanks-Morse 450 HP Diesel Generating Unit, U. S. Naval Air Station, Floyd Bennett Field, Brooklyn, N. Y. Building in which the engine was installed was designed as boiler room. As soil conditions were very poor, an unusual foundation had to be provided.

YOU *CAN* isolate a Diesel engine after it has been installed, but it is far more economical to include vibration control equipment in the original foundation drawings.

It's easier, too. There are many types of isolators. When vibration control is included in your plans from the beginning, your foundation can be designed to accommodate the best isolator for your needs. You don't have to compromise because of some unchangeable, built-in factor. Expensive inertia blocks do not have to be remade.

Satisfactory isolation of vibration can be determined in advance. Korfund engineers have been designing foundations for more than forty years, and the records show over a quarter of a million successful installations!

Don't wait for vibration to become a problem. Write for complete details of Korfund Vibration Control. And call in a Korfund engineer *before* you plan your installations.

KORFUND
VIBRATION CONTROL

THE KORFUND COMPANY, Inc., 48-28 32nd PL., LONG ISLAND CITY 1, NEW YORK

HOME for them!

and the HOME STRETCH for YOU!

You still have time! In December, your employees' allotments to the Victory Loan through your company's Payroll Savings Plan offer a final chance to help speed the proud homecoming of our fighting men—and do all in medical power for our hospitalized heroes!

Make December a plantwide TOP-THE-QUOTA drive! Now's the time to spotlight your Payroll Savings Plan—and "brief" your Bond-selling organization for fast, last minute action!

Resolicit every employee to buy the New F.D.R. Memorial $200 Bond

The new Franklin Delano Roosevelt $200 Bond—better than actual cash because it earns interest—is a strong building stone toward the secure future of every employee-purchaser!

From now 'til the New Year—with plant rallies, interdepartmental contests and resolicitation—keep Payroll Savings Plan Bond-buying at a new Victory Loan high! Buying a Victory Bond is the best way of saying "Welcome Home" to our returning veterans! Also an active aid in assuring prosperity to your nation, your employees—and your own industry!

VICTORY LOAN

The Treasury Department acknowledges with appreciation the publication of this message by

Robert F. Hadman

Editor—DIESEL PROGRESS

Navy Day Appropriately Observed in Cleveland

CLEVELAND'S Navy Day observance, while not highlighted with the august presence of the Fleet, was most appropriately and signally honored with the visit of Vice Admiral Charles A. Lockwood, Jr., USN.—the man who directed the telling activities of our submarine fleet in the Pacific. The very appropriateness of this occasion lies in the fact that most of Admiral Lockwood's submarine fleet was powered with Diesels built in General Motors' Cleveland Diesel Engine Division and manned by engine technicians who were trained in the General Motors school here. So naturally the Admiral spoke with feeling of the men and engines that took the subs out and brought them safely back after gruelling, 70-day cruises when he addressed a luncheon given in his honor by George W. Codrington, Vice President of General Motors Corporation and State Chairman of the Ohio Navy League. The marvelous score piled up by our Pacific submarine fleet totals 1000 Jap ships sunk or put out of commission, including one Battleship, 8 Carriers, and 50 Destroyers. Highlight of Admiral Lockwood's moving address was his gift to Mr. Codrington of the surrendered dress sword of the commander of the Jap super-submarine I-401.

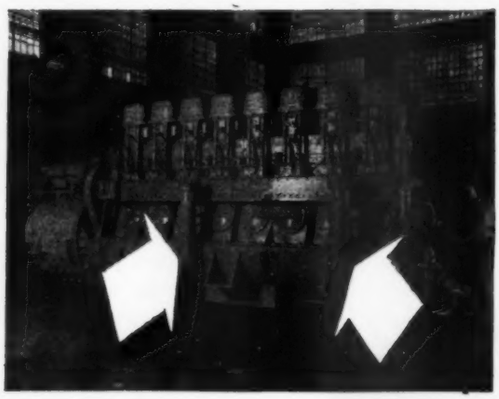
Vice Admiral Charles A. Lockwood, Jr. USN presenting George W. Codrington, Vice President of GM and General Manager of the Cleveland Diesel Engine Division of GM, with the dress sword of the commander of the Jap super-submarine I-401.

NEW 2000 HP LOCOMOTIVE USES NUGENT FILTERS

for cleaner oil.. ..greater efficiency

• This new 2000 HP diesel locomotive for both freight and passenger service is driven by two 8 cylinder diesel engines. Each engine has two Nugent Lube Oil Filters, for thorough protection against dirt and foreign matter in the lubricating oil.

Nugent filter protection increases engine efficiency, prevents trouble by removing dirt particles to insure virtually 100% clean oil. Nugent filters have 20 times more filtering area than most filters of comparable size. Write today for bulletin 7A which gives full details.



One of the two 8 cylinder diesels that power this new 2000 HP locomotive. Arrows show the Nugent Lube Oil Filters that keep oil practically 100% clean.

Nugent Filters

ESTABLISHED 1897

WM. W. NUGENT & CO., INC.

415 N. Hermitage Ave. Chicago 22, Illinois

Fuel Oil Filters
Lube Oil Filters
Lubricating Systems
Sight Flow Indicators
Oiling Devices

The hairspring in
a watch is small
...but how important it
is to the performance
of that watch.

Piston rings are likewise
small parts of any Diesel engine
...but not small in
importance to manufacturers
of Diesel engines.

PC

The world's finest piston rings are standard equipment for these world-famous Diesel engines—Buda • Caterpillar • Cummins • Hercules • Hill • International Harvester • Kermath • Lathrop • Lister-Blackstone • Mack • Murphy • Sheppard • Waukesha-Hesselman.

The Perfect Circle Companies

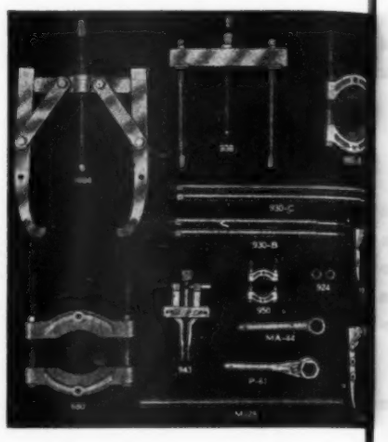
Hagerstown, Indiana • Richmond, Indiana • New Castle, Indiana • Tipton, Indiana • Toronto, Ontario, Canada

New Railroad-Type Diesel Governor

WOODWARD Governor Company has announced a new type SI governor specially designed and constructed for modern Diesel road and switching locomotives. The new governor, while based on the company's wide experience in building SI governors for all types of engines, embodies certain desirable characteristics such as rugged construction; tamper-proof safety features; built-in control auxiliaries; pneumatic-hydraulic control with variable speed over the entire range; operating characteristics adjustable to desired engine performance and provision for connecting engine safety devices to shutdown or reduce speed setting through protective auxiliaries in the governor itself. Write Woodward Governor Company, Rockford, Illinois for full particulars on its new SI, railroad type governor.

Diesel Service Set

THE OTC Diesel service set was especially selected to meet the requirements of Diesel service men in railroad shops, highway s utilities and others. It includes three req sizes of Gripomatic pullers, one push-puller extension legs, sheave pulling attachment other attachments, 1⅜ in. heavy duty wrench with tubular handle, and a push-p reversible ratchet.



It is said to be a complete universal set Diesel service and maintenance. A sturdy by 4 ft. service board for keeping tools h is also available. The OTC pulling system time, energy and damage to machinery i moving and replacing close-fitting parts as gears, bearings, wheels, pulleys, shafts, For full information write to Owatonna Co., 358 Cedar St., Owatonna, Minn.

Friction Sawing Booklet

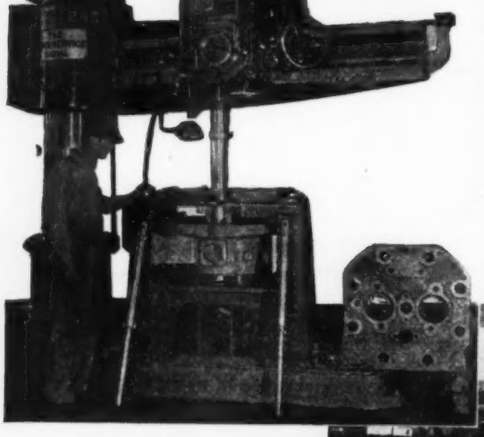
THE new technique for cutting mate known as "Friction Sawing" recently develo through the innovation of high speed sa machines is now described in detail in a 24-page booklet being released by the Mac Tool Division of the DoALL Company. booklet explains why "Friction Sawing" is sible; its advantages and its limitations. particular interest is the "Job Selector" char cluded in the booklet which contains a r reference for selecting the proper sawing fac in cutting SAE steel, armor plate, stainless s illium, cast steel and cast iron.

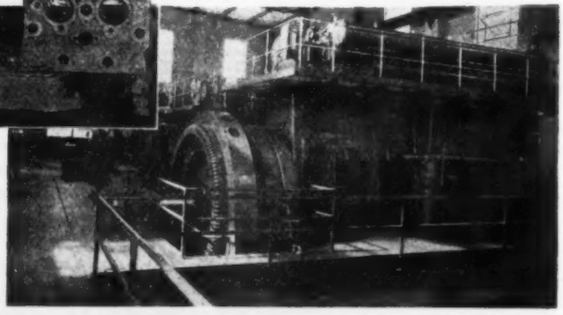
Photographs and charts are used to illus the cutting rates to be expected from "Fric Sawing" including radii cutting factors, sawing and finish. Some 30 photographs s various applications for friction sawing in fo dries, experimental laboratories, produc maintenance or salvage work. Copies of booklet are available upon request from DoALL Company, (Machine Tool Divi 1301 Washington Avenue South, Minneapol Minnesota.

INTERCHANGEABILITY

Long ago, we here at Fulton, recognized the meaning of interchangeability of parts and we tooled our production of Fulton Diesels to give our users this outstanding maintenance economy. Jigs and fixtures are applied to every possible machining operation to produce uniform parts, an exceptionally well co-ordinated engine and to permit replacement with the minimum of time and expense. That is another reason why Fulton Diesels all over the country are turning in remarkably low operating and maintenance cost records.

1852 Successful Engine Builders For 93 Years 1945





Top: Large base plate of Fulton Model BGS Diesel with drilling jig clamped in place. Above: View showing fixture for machining Model BGS cylinder heads. Right: Four large Fulton Diesels installed in the Algona, Iowa, municipal power plant.

FULTON IRON WORKS CO.
• ST. LOUIS • MISSOURI •

TUGS
TRAWLERS
TANKERS
BARGES

Complete facilities for construction, repairs and rebuilding engines, including one of the best equipped machine shops in the industry. Welding a specialty. All departments maintained and staffed to handle capacity volume on schedule. Phone TRemont 2-6100.

WOOD OR STEEL CRAFT • ALTERATIONS
CONSTRUCTIONS AND REPAIRS

CONSOLIDATED SHIPBUILDING CORPORATION
MORRIS HEIGHTS, NEW YORK

National Supply Appoints John B. Mensing

JOHN B. MENSING, Assistant Treasurer of The National Supply Company, has been appointed General Credit Manager replacing Dana J. Fox, who is resigning to become President of Fretz-Moon Tube Company.

Mr. Mensing has been in the Credit and Treasury Department of National for over twenty-five years.

Nordberg Issues Stationary Diesel Bulletin

DEPICTING more than 30 years of Diesel development of large, heavy duty engines, the new Nordberg bulletin No. 122, just issued, is both interesting and informative. Illustrated with short descriptive texts is the first 1250 hp. Diesel built in America which is 28 years old and still running every day; the first port scavenging, 2-cycle Diesel developed in this country; a 4000 hp. Diesel, the largest of its day built in America in 1925 and on down to the recent 6400 hp., 9-cylinder unit, Nordberg's most recent development. Construction details, also fluid systems are described and illustrated. Copies of this valuable bulletin will be mailed to those interested on request to Nordberg Manufacturing Company, Milwaukee 7, Wis.

Hydraulics Expert to Aireon Executive Post

RALPH E. MIDDLETON, a vice president of Aireon Manufacturing Corporation, has been named general manager of the corporation's Hydraulic division at Burbank, Calif., R. C. Walker, president and general manager, has announced. Mr. Middleton had been chief engineer there since 1941. Prior to his association with Aireon, Mr. Middleton was connected with Curtiss Wright Corp. as staff engineer on landing gear design. He designed the gear and tail wheel installations for the C-46 and other Curtiss Wright models.

Aircraft Engines of 10,000 Horsepower

IN its gas-turbine aircraft engines, the General Electric Company has the basis for future engines of as great as 10,000 horsepower, more than the combined power of the B-29's four engines, predicts Harry A. Winne, G-E vice president in charge of engineering. Mr. Winne explained that in making his prediction of 10,000 horsepower gas-turbine engines he was not establishing a limit to their development. Research and engineering alone will determine this, but the horizons appear to be limitless, he said.

The G-E jet engine which powers the Lockheed P-80 fighter already generates more power than any other aircraft engine and drives the plane faster than any other will fly, G-E engineers explained. In addition, intensive work is being done on the Propjet, a revolutionary new power plant which uses gas-turbine force to drive a propeller and provide a jet thrust simultaneously. Designed primarily to drive high-speed military transports and bombers, the Propjet has been subjected to rigid test-stand runs and has been installed in an experimental Army Air Forces plane of advanced design.

Donaldson Company Appoints John C. Enblom

THE Board of Directors of the Donaldson Company, Incorporated, announces the appointment of John C. Enblom as president and general manager of the St. Paul plant. Mr. Enblom will also serve as president of Donaldson Company (Canada) Ltd.

Mr. Enblom, formerly executive vice-president and general manager of the St. Paul plant, takes over the position of president left vacant since the death of Frank A. Donaldson, founder of the company. Mr. Enblom is a graduate of the Institute of Technology, University of Minnesota. He joined Donaldson in 1934.

Centrifugally Cast
DIESEL CYLINDER LINERS

CENTRIFUGALLY CAST DIESEL CYLINDER LINERS by JANNEY are furnished in the completely finished condition ready for immediate installation. Liners are produced under the closest of scientific and laboratory controls. Our facilities for production of liners having I.D's ranging between 8" and 14" are exceptionally adequate. We stress that all liners must be void of "free ferrite" which is a most energetic source of scoring. Liners can be furnished with the PORUS-KROME* treatment. Our technical staff is at your service supplemented by our many years experience in cast iron metallurgy.

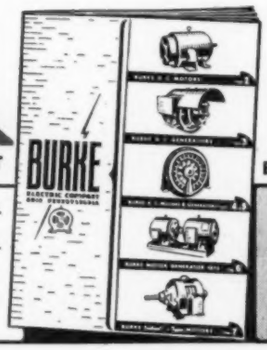
*Van der Horst

JANNEY CYLINDER COMPANY
7428 STATE ROAD, PHILADELPHIA 36, PA.

What can BURKE do for Me?

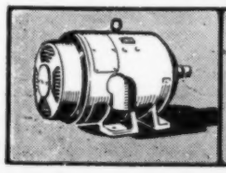
HERE'S a quick look at Burke Products to answer the headline question. When you examine each booklet, more specific questions will develop, questions that Burke engineers will be glad to answer

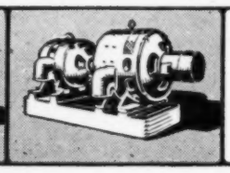
You may be surprised to learn that Burke pioneered and perfected the Universal Motor and the 3-Wire D. C. Generator, that Burke introduced the high cycle Motor Generator Set for powering High-speed Tools, and that Burke was first to use electric welding construction. In order to have you know Burke better we will be glad to send you a complete set of these Burke Bulletins.



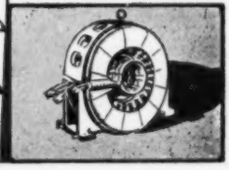
For quick reference to the Burke line, see Sweet's Catalog File and Electrical Buyers' Reference Catalog.

BURKE ELECTRIC COMPANY • 5512 WEST 12TH STREET ERIE, PENNSYLVANIA





D.C. Equipment to 1500 H.P. and 1000 K.W.
A.C. Equipment to 1500 H.P. and 1000 K.W.
M-G Sets to 1000 K.W.
Molded Bakelite Terminal Blocks



Aireon's New Officers

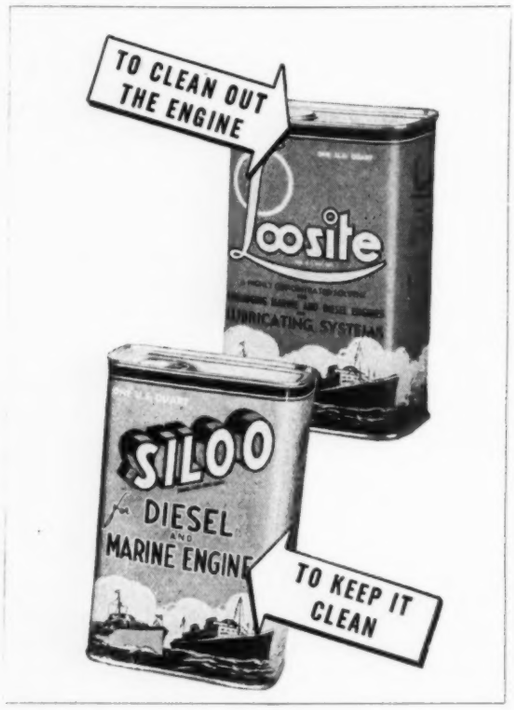
A. E. WELCH, formerly Vice President and Treasurer of Aireon Manufacturing Corporation, has been appointed Executive Vice President and Treasurer of the corporation and of its wholly owned subsidiaries, Randolph C. Walker, President, has announced. At the same time, Mr. Walker announced the appointment of Jack Kaufman of San Francisco, as a Vice President of Aireon.

Mr. Welch, a native of Dayton, Ohio, joined Aireon in March 1944 as Controller for the Electronics Division. He formerly was associated with Curtiss-Wright Corporation and the Frigidaire Division of General Motors Corporation, both at Dayton, Ohio and in New York.

Mr. Kaufman joined the company only recently to head the San Francisco office which serves the transportation and communications industries on the Pacific Coast, and to participate in the steadily growing operations of the company in the field of Electronics in this country and abroad. He had been engaged in electronics in San Francisco for a number of years.

CLEAN ENGINES

LAST LONGER



Smooth running, long lasting power requires a clean engine—an engine free of sludge, gum and acid which accumulate in the lubricating system and cause it to become sluggish and unresponsive. These petroleum residues are a major factor in destroying engines.

LOOSITE and **SILOO**, swift-working solvents of petroleum residues act quickly and safely to eliminate sludge, gum and acid. **LOOSITE** cleans out the engine—then **SILOO** added to fresh crankcase oil keeps it clean. A simple harmless, economical method of obtaining maximum performance and longer life.

Since every lost day of service means decreased income, preservation of motors is vital. Get the full story and use **LOOSITE** and **SILOO**. **LOOSITE** and **SILOO** can be used safely and effectively with *any* type oil and filter.

PETROLEUM SOLVENTS CORP. • 331 Madison Avenue, New York 17

If you heat with oil—write for information on SILOO FUEL OIL TANK SOLVENT.

Woman Studies Truck Servicing At G.M. Institute

ANY one who thinks that the automotive business, particularly the job of selling and servicing trucks, is a man's world should meet Mildred Sandvig of Prosser, Washington, who knows the carburetors and crankshafts in the back shop as well as the new trucks and customers out front. Miss Sandvig, who has the singular honor of being the only woman to date to enroll in the Dealer Service Managers Training Course at the General Motors Institute in Flint, Michigan, takes a very active part with her brother in the management of the Sandvig Motor Company, sales and service headquarters for GMC trucks in Prosser. She was one of a recent class of thirty-four.

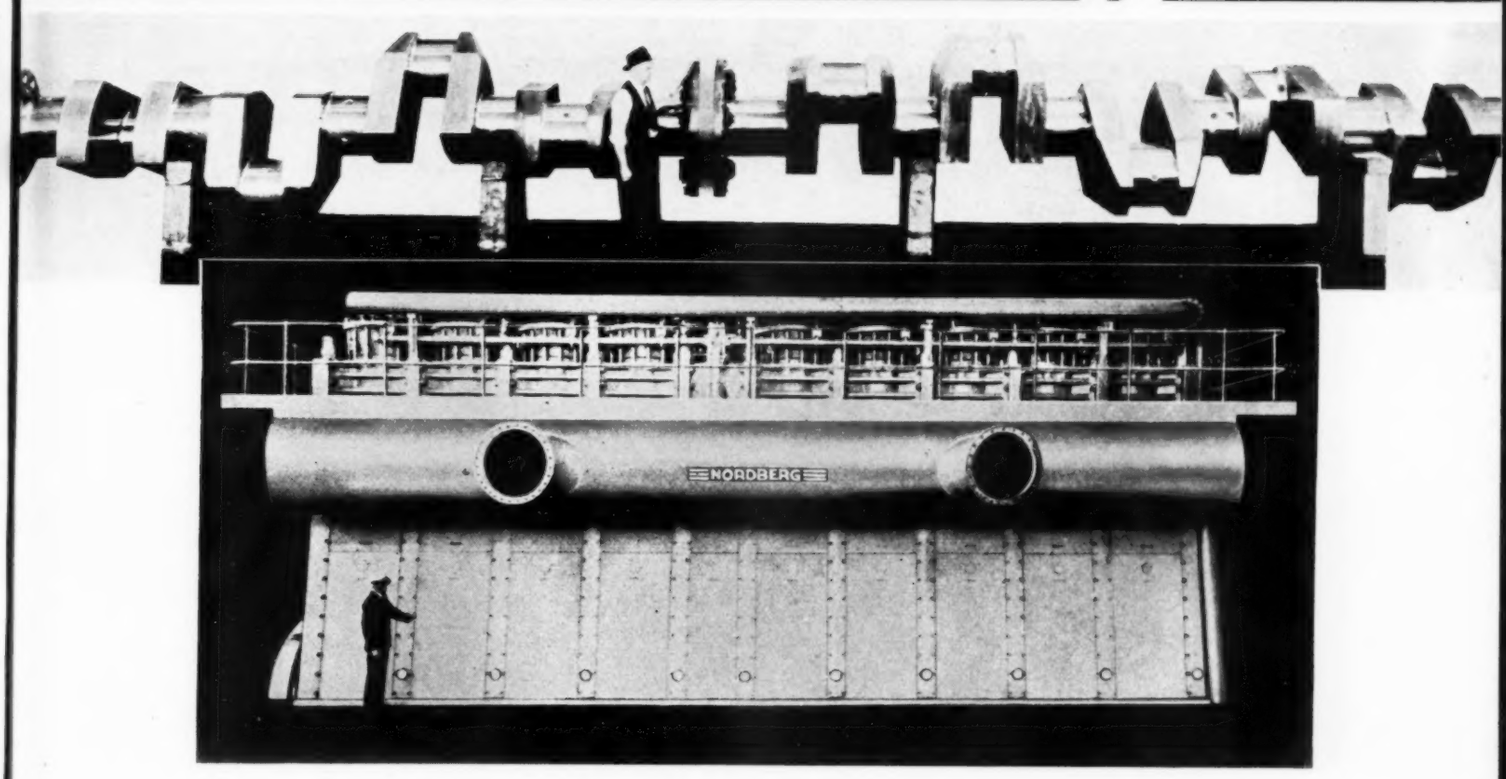
The class of thirty-four which recently took the dealer service managers course at the General Motors Institute, Flint, Michigan.

When asked what prompted her to take the GM Institute training Miss Sandvig stated, "My brother and I alternate in the various duties of operating our business and I realized that I must know the problems of service management and how to solve them in our own shop. Selling a good product is only half the job—seeing that the customer gets satisfactory service is the most important thing from a good-will standpoint," she added.

The Diesel Engine Catalog

THE 1945 Edition of the DIESEL ENGINE CATALOG, Volume 10, is ready for distribution. It is the largest edition yet published—532 pages, hundreds of illustrations—a *Composite Catalog* of the *Entire Diesel Industry*. Page size 10⅛ in. x 13½ in.—a big book and a real value. A separate section devoted to each manufacturer's line of engines with completely illustrated descriptions and specifications—covering stationary, marine, automotive and railway types. Other sections cover Diesel accessories such as fuel injection equipment, chain and gear drives, electric, hydraulic and mechanical couplings, superchargers and many other items. Also contains a directory of products and manufacturers. An indispensable book for all interested in Diesels. Paper restrictions limit the supply so order your copy promptly—a convenient coupon will be found on page 109 of this issue.

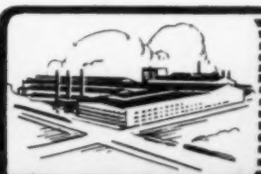
Forty-Ton Crankshaft



This is the crankshaft made in our shops for the big nine-cylinder, 6000 S.H.P. Nordberg Diesel which propels the new U. S. Maritime Commission Cargo Ship, EMORY VICTORY. With two sections bolted together it comprises a continuous shaft 41 ft. 2 inches long, weighing 80,750 pounds with nine rod journals and eleven main journals finished to extremely close tolerances. All the highly skilled craftsmanship and modern equipment at our command is needed to carry such a product through many intricate steps in manufacture to the perfectly balanced, utterly dependable element that it is.

America's Leading Diesels Are Equipped With Erie Forge Shafting.

ERIE FORGE COMPANY, ERIE, PA.



Tocco Division Opens New Office

ANNOUNCEMENT is made by Wm. C. Dunn, President, The Tocco Induction Division of The Ohio Crankshaft Company, Cleveland, of the opening of a sales-engineering office in Indianapolis, Indiana under the direction of James W. Calloway, formerly connected with the Chicago Tocco office. Located at 35 East Georgia Street, Indianapolis 4, the new facility will broaden Tocco's coverage of the Indiana metal working market.

New Chief Engineer at American Steel Dredge Company

FRED J. SCHMIDT, formerly chief marine engineer of Pennsylvania Shipyards, Inc., Beaumont, Texas, has been named chief engineer of the American Steel Dredge Company at Fort Wayne, Indiana, Walter W. Walb, ASD vice-president and general manager, recently announced.

Mr. Schmidt will do engineering work on hydraulic, dipper and clamshell dredges, crane and cargo barges, and special hulls for various types of shallow draft vessels, all of the standard bolted steel design patented by the American Steel Dredge Company. As chief engineer he will be a member of the ASD consulting staff, members of which are available on all problems of dredging operations or dredging equipment. The new ASD chief engineer was with the Pennsylvania Yards during the war when that concern was producing Type "C" cargo vessels and Type "AM" Diesel-electric mine sweepers.

Button-quick STARTING FOR DIESEL ENGINES

AT THE touch of the button, Globe *Spinning Power* gets a powerful Diesel engine under way. Here is dependable battery power with long, trouble-free service life—power you can bank on in any temperature.

More and more, electric starting Diesels are factory-equipped with Globe Spinning Power Batteries.

The Globe engineer nearest you will be glad to help you with your battery needs. Learn from him why Globe Spinning Power Batteries, with Perma-Set Plates, are better for your Diesels. Simply write the Globe factory nearest you.

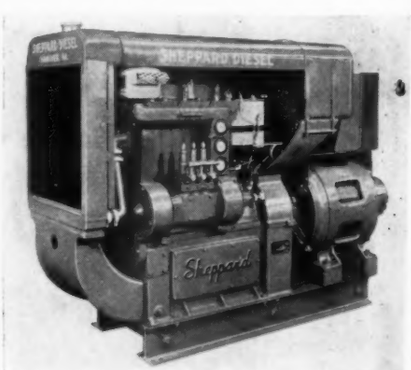
GLOBE-UNION INC., *Milwaukee 1, Wisconsin*

ATLANTA • BOSTON • CINCINNATI • DALLAS • KANSAS CITY
LOS ANGELES • MEMPHIS • MINNEAPOLIS • PHILADELPHIA • SEATTLE

DP-1245

Completely Automatic Load Starting Perfected for Diesel Generating Sets

THE recent development of completely automatic Load-Control of Diesel generating sets by engineers of the R. H. Sheppard Company makes it possible for operators of this type of equipment to realize still greater power-cost savings than they are now enjoying. Because Load-Control cuts operating time of the power plant to periods when power is actually required, it reduces fuel consumption and prolongs the life of equipment.



Sheppard Model 6A Diesel-Generating Set equipped with Load-Control.

Load-Control is exactly what its name implies. The load demand on the power circuit controls the starting and stopping of the power source.

The flick of any lighting or appliance switch on an electrical circuit supplied by a Diesel generating set equipped with Load-Control will automatically start the generator. Power is instantly available. Turn off the switch and Load-Control immediately stops the power plant.

Load-Control requires no special wiring. Simply connect to present service leads. Available for single or 3 phase generators. Load-Control will be available exclusively on Sheppard Diesel Generating Sets. For full particulars write R. H. Sheppard Company, Hanover, Pa.

A prominent oil company discovered—like many other industrial users of Diesel generator equipment—that maintenance has been greatly simplified by SPECIFYING WESTINGHOUSE for COMPLETE ELECTRICAL EQUIPMENT. By procuring electrical equipment from ONE RESPONSIBLE SOURCE, confusion and delay are eliminated in ordering, installation, servicing and maintenance—because there is only *ONE* place to call in case of emergencies.

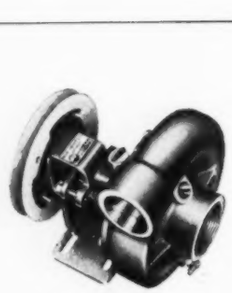
Westinghouse can supply all the electrical equipment required—generators, exciters, voltage regulators, switchboards, circuit breakers, transformers, controls and auxiliary equipment. Moreover, Westinghouse engineers assume full responsibility for electrical co-ordination. Generators are matched to the characteristics of the Diesel engine and the associated electrical equipment is carefully selected to provide maximum generator performance.

And when it comes to service or maintenance, your worries are over. Thirty-four strategically located Westinghouse service shops are open twenty-four hours a day. You get immediate action when you call Westinghouse.

For more information, call your nearest Westinghouse office or write for your copy of booklet B-3028, "A-C Generators for Diesel Engine Drives", Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J10297

Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

COMPLETE ELECTRICAL EQUIPMENT FOR DIESEL ENGINE DRIVES



Centrifugal Pump

Combination Foot Valve and Strainer

Model 3100 Reversible Pump

DESIGNERS AND BUILDERS OF PUMPS FOR SPECIAL NEEDS. Famous for soundly engineered reliability, Marine Products has set a record for world-wide service and low maintenance costs. Use M-P equipment in your field.

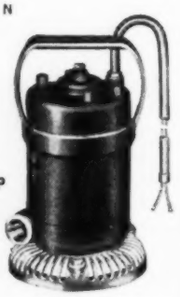
Industrial MP *Marine*

ENGINEERED EQUIPMENT

MARINE PRODUCTS COMPANY

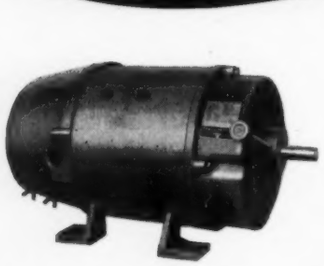
6636 CHARLEVOIX AVE. • DETROIT 7, MICHIGAN

Model 3600 Clutch and Pump



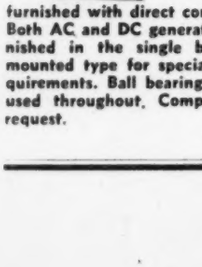
Electric Pump

GENERATORS *AC and DC*



Well-known for their rugged design, efficient performance, long life and minimum maintenance, whether powered by electric, gasoline, or Diesel equipment. Backed by over ½ century of manufacturing and designing experience, Kurz and Root generators are now serving industries throughout the world.

Illustrated are AC generators, only 2 of the many different types developed and designed to fit specific needs and applications. (upper) two-bearing self-excited type; (right) two-bearing, direct connected exciter type.



DC generator (lower) two - bearings, self excited type. Can also be furnished with direct connected exciter. Both AC and DC generators can be furnished in the single bearing, flange-mounted type for special mounting requirements. Ball bearing construction is used throughout. Complete data upon request.

AC-DC GENERATORS

KURZ and ROOT Company

APPLETON - WISCONSIN

Since 1898

.....and DC motors and motor generator sets

Fairbanks, Morse & Co. Announces Two Sales Executive Changes

TWO changes in the sales executive organization of Fairbanks, Morse & Co. have just been announced by Robert H. Morse, Jr., Vice President and General Sales Manager.

New acting manager of the Railroad Division is John S. King, formerly manager of the company's Pump Division. He succeeds C. H. Wilson, who is on an extended leave of absence due to his health. Arnold G. Brown, formerly assistant manager of the Pump Division, succeeds Mr. King as manager of that division. Mr. King is a veteran in the Fairbanks-Morse organization. He started as a student in the Beloit plant where he assembled and tested pumping equipment and Diesel engines.

Arnold G. Brown

Mr. Brown was general sales manager of the Pomona Pump Company, when it was purchased a year ago by Fairbanks, Morse & Co. Soon afterwards he was made assistant manager of the Pump Division. A graduate engineer of the University of Syracuse in 1929, Mr. Brown traveled extensively as an engineer until 1937 when he went with the Pomona Pump Co. as a junior engineer in the sales engineering department. Later he became the firm's Southeastern manager, and at the beginning of the war was moved to New York and Philadelphia where he was in charge of the firm's government procurement contracts. In 1943 he was appointed assistant sales manager and just before the firm was purchased by Fairbanks-Morse was made General Sales Manager.

Bunting Brass & Bronze Appoints Lt. Col. John S. Tawresey

LT. COL. JOHN S. TAWRESEY has been appointed Vice President in Charge of Engi-

neering of The Bunting Brass & Bronze Company where he will direct research and study of modern bearing design and applications in the light of advancements made during the war, and the requirements of modern mechanisms in all fields. He will have charge of all engineering related to the product, its manufacture, design, application and improvement.

Lt. Col. John S. Tawresey

Col. Tawresey comes to Toledo from Wright Field, Dayton, Ohio, where he served as Executive Assistant to the Chief of the Resources Control Section of the U. S. Army Air Corps. Commissioned as Major at the outbreak of the war he first served at Miami Beach and Wright Field in various technical assignments. He is a veteran of both world wars being commissioned Captain in the Signal Corps in World War I.

Donaldson Opens Three Offices

TO better serve the field, the Donaldson Co. has opened three new field offices, according to John C. Enblom, President. The new Cleveland office under the management of G. C. Bohn is located at 2114 Lamberton Road, Cleveland Heights. The Chicago office at 600 S. Michigan Ave. is managed by C. D. Walter. The Detroit office at 6432 Cass, will be managed by F. H. Funke.

DIESEL PROGRESS Editorial Index

A COMPLETE index of all editorial material which appeared in the 1944 issue of DIESEL PROGRESS is now available. Included is a cross index of authors and articles. Feature articles are covered by title; news notes are indexed by names of manufacturers. No charge for this index. Address requests to DIESEL PROGRESS, 2 West 45th Street, New York, 19.

Here's why THOMPSON DIESEL ENGINE VALVES CUT MAINTENANCE COSTS!

IF YOU operate any stationary or mobile diesel equipment—from the smallest industrial engine to the largest, in any kind of service—you can increase engine efficiency, extend time between overhauls and cut your maintenance expense with Thompson Valves, Seats and Guides.

THE REASON IS THIS: Thompson Valves are made by a hot-forging process from steels especially developed for valve use—"Fercrome L" stainless steel for the valve head, chrome nickel for the stem. These two steels combine to give you a valve that is free from oxidation, scaling and corrosion to 2000° F, has high ultimate strength values at high temperatures, and maintains perfect alignment for efficient valve operation. **Result: Continuous smooth operation at peak loads and under the most severe service conditions!**

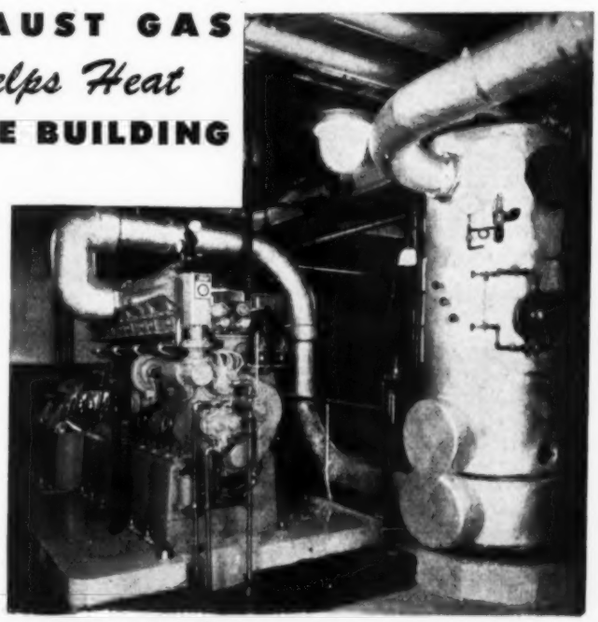
Thompson Valves, Seats and Guides are standard equipment in **most** of the leading diesel engines manufactured . . . proof of the quality, long life and trouble-free service built into them. **In the original engines you buy . . . and for replacement needs in your present equipment—make sure you specify Thompson!**

SEND FOR THIS BOOKLET—Here's helpful information your mechanics and maintenance engineers can use to increase the service life of diesel engine valves, seats and guides. Contains non-technical data on engine valve installation and maintenance . . . facts gleaned from over 40 years experience in this field. Your copy will be mailed without obligation—write today.

Thompson Products, Inc.

WEST COAST PLANT • BELL, CALIFORNIA

SIMS EXHAUST GAS BOILER *Helps Heat* LARGE OFFICE BUILDING



Make your plans for this method of utilizing engine exhaust gas heat. At the right we show how the exhaust from a natural gas engine at 950°F is run thru a Sims Boiler to produce steam at 7 to 10 lbs. pressure to help heat a large office building. This is one of many methods of turning waste heat into profit heat described in the Sims Heat Recovery book of case studies. *Write for copy to-day.*

The SIMS COMPANY • BOX 1096C • ERIE, PA.

SIMS HEAT RECOVERY EQUIPMENT

HEAT EXCHANGERS • EXHAUST GAS BOILERS • ENGINE SILENCERS • STORAGE WATER HEATERS • OIL HEATERS • OIL COOLERS • FEED WATER HEATERS AND UNIT TYPE PULVERIZERS

. . . It's no "Grind" . . .

Grinding Diesel Locomotive Valve Seats

. . . to Service Valve Seats!

Servicing diesel valve seats is a fast, easy, factory-precision operation with the HALL Model EDP ECCENTRIC Valve Seat Grinder. It removes only enough metal to true up the seat. Saves the valuable hardened surface created by the seating action of the valve under terrific heat. The result: better valve performance longer at less cost. Write today for complete information.

THE HALL MFG. COMPANY
TOLEDO 7, OHIO

HALL DIESEL TYPE VALVE SEAT GRINDER

Worthington Host to Officers Of Chinese Navy

THE Buffalo Works of the Worthington Pump and Machinery Corporation was host to a visiting party of 21 officers of the Chinese Navy who are in this country as the guests of the United States Navy. Now on a tour of American plants building Navy equipment, the Chinese officers, including Commanders H. P. Lin, H. F. Chow and S. L. Chen, spent the day inspecting the facilities of the Buffalo Works and were honored at a banquet held for them by Worthington at Buffalo Athletic Club.

B. R. Little, Worthington Sales Engineer, conducting party of Chinese Navy officers through Worthington Buffalo plant.

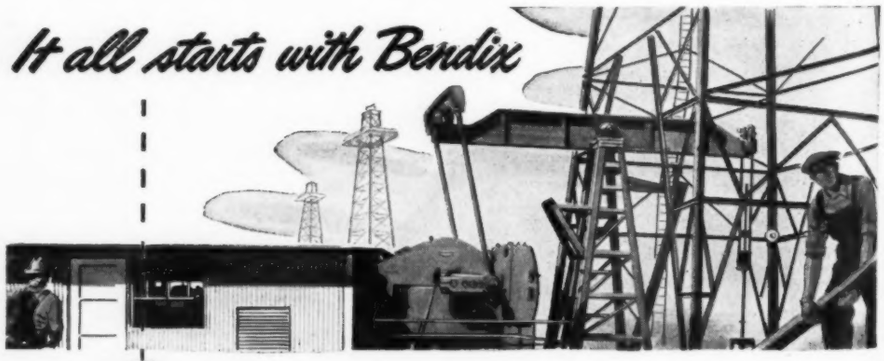
Headquartered at the Philadelphia Navy Yard, the Chinese officers expect to return to China sometime after the first of the year to assume leading roles in the reconstruction and expansion of their Navy. Lieutenant Commander J. J. Bowe, USN, is acting as their escort while they are in this country.

D. E. M. A. Issues Diesel Locomotive Booklet

THE extent to which Diesel locomotives are replacing steam locomotives on United States railroads is brought out in a new booklet, "Diesel Locomotives," issued by the Diesel Engine Manufacturers Association. Last August, according to a chart in the booklet, there were 2,184 Diesel switchers in use in the country, and railroads have practically ceased buying any other type of switching locomotive. The first Diesel passenger locomotive appeared in 1934.

Today there are nearly 200 in service. The number of freight locomotives has increased at an even greater rate. Four years ago there were 11; the country's railroads now own 295. A copy of "Diesel Locomotives" may be obtained by writing to the Diesel Engine Manufacturers Association, One North LaSalle St., Chicago 2.

It all starts with Bendix



The Drive for Heavy-Duty Starting

Heavy-duty industrial machinery demands quick, dependable starting—and Bendix Heavy-Duty Starter Drives provide just that.

Specifically designed for the task at hand—engineered to operate satisfactorily even under adverse working and weather conditions—Bendix Heavy-Duty Starter Drives are performance-proven in starting all types of industrial machinery.

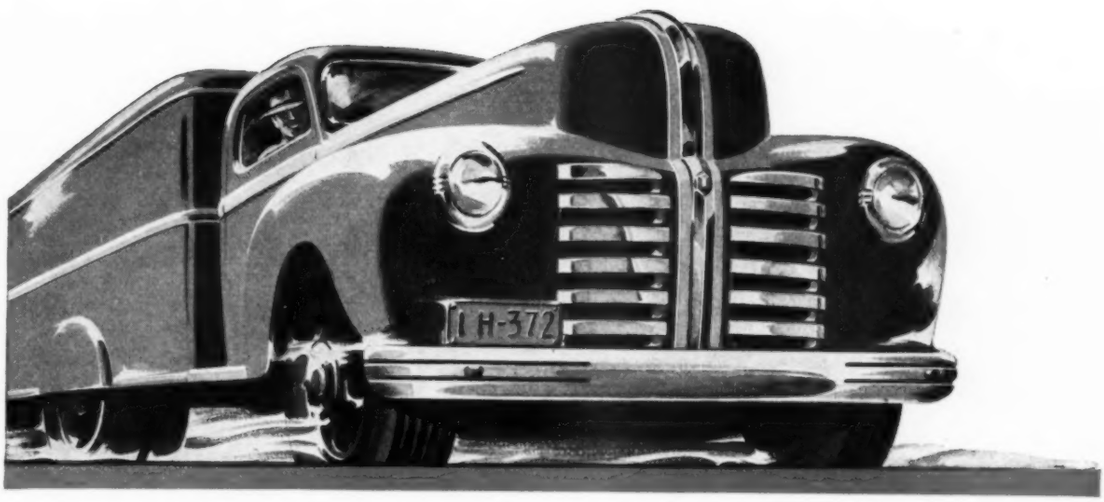
In the forests—on the farms—in the oil fields and in the factories—in fact, wherever heavy-duty starting demands *the best*—it's Bendix! Over sixty-five million installations of Bendix Starter Drives to date—many more *tomorrow*. Better buy Bendix!

*REG. U. S. PAT. OFF

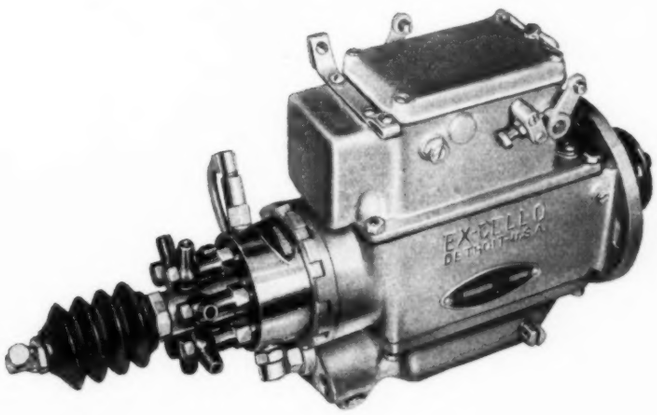
Bendix Drive

Bendix AVIATION CORPORATION

ECLIPSE MACHINE DIVISION • ELMIRA, NEW YORK



In War or Peace . . still Dependable



Fuel Injection Equipment for DIESEL Power

EX-CELL-O Fuel Injection Equipment is again ready to do a peacetime job for Diesel Engine Builders.

The Type KB Ex-Cello-O Fuel Injection Pump for variable speed applications features automatic timing that provides maximum power output and minimum fuel consumption.

A worthy complement to the KB pump is the Ex-Cell-O Nozzle. Backed by seventeen years of research and production, it is designed for trouble-free service.

Write Ex-Cell-O today for complete information.

Fuel Injection Division

EX-CELL-O CORPORATION XLO DETROIT 6, MICH.

EX-CELL-O

FOR 25 YEARS...
AUTO-DIESEL
LADLE TEMPERED PISTON RINGS
HAVE GIVEN *Good Service* TO MANY!

Our record of repeat orders that have come to us year after year from many firms is something of which we are very proud. It is due to the fact that down through the years we have produced the kind of rings that satisfied our customers. AUTO-DIESEL "Ladle

Tempered" Piston Rings are used as original equipment and replacement for Diesel powered units of all types —stationary and mobile units and hydraulic and pneumatic operated industrial equipment.

Write for Information

THE AUTO-DIESEL PISTON RING CO.
3151 SUPERIOR AVE. CLEVELAND 14, OHIO

QUALITY RINGS SINCE 1921

How Thousands of Gasket Improvements

are being effected by Fel-Pro Developments in

Thiokolized Gaskets

For that New Design . . . or Re-Design! *Investigate* the 2 BIG ADVANTAGES of Fel-Pro's Pioneering Development and Production of Thiokolized and other specially treated Gasket Materials.

Through Thiokolizing and other treatments of such gasket materials as Felpak, Karropak, Fishpaper, Chipboard, Fibre, Cork and others . . . a host of new, improved gaskets are being produced for thousands of America's leading manufacturers.

Most of these were developed originally to meet a specification . . . a car builder needed a more durable, oil resisting gasket . . . an electrical device maker, similar material with high insulating and sealing qualities . . . an auto accessory maker, an oil resisting gasket with tremendously high tensile strength . . . etc.

Fel-Pro has the Know-How to provide the proper gaskets for your requirements and the PRODUCTION KNOW-HOW to produce them ECONOMICALLY and to highest quality standards. *Write Today for* FREE PORTFOLIO OF LATEST SEALING MATERIALS *and further details of our* NO CHARGE CONSULTATION SERVICES.

with Sealing Materials, Gaskets, Packing, Sound and Vibration Dampeners, Washers, specially die-cut, treated and fabricated by

1198

FELT PRODUCTS MFG. CO., 1522 CARROLL AVE., CHICAGO, ILL.

Cummins Engine Company Expands Sales Department

THE Cummins Engine Company, Inc., has reorganized its sales department, creating two new sales divisions. Paris E. Letsinger, the company's vice president in charge of distribution, announced the new set-up is designed to coordinate activities in the expanded peacetime markets for Cummins Diesels.

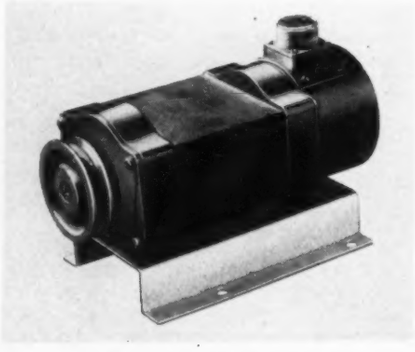
Left to right: J. D. Allen, F. W. Sparks, N. E. Palmer.

In the reorganization, Norman E. Palmer becomes general sales manager to work directly with Mr. Letsinger. J. D. Allen becomes sales manager of dealer organizations, and Fred W. Sparks becomes sales manager of manufacturing accounts.

The specialized sales department is the outgrowth of the steady expansion of the Cummins Engine Company, Inc. Construction work is expected to be completed soon on the most recent addition to production facilities, which will enable Cummins to double its output of the 250 hp. medium-speed Cummins Diesel, used in oil field and Diesel-electric locomotive applications.

Light-Weight Generator

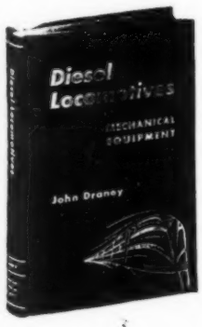
A GENERATOR weighing but one-half as much as formerly available equipment but capable of supplying up to 1200 watts in continuous duty is announced by Electrical Engineering and Manufacturing Corporation.



EEMCO Light-weight Generator

Originally developed as an airborne unit for remote radar stations, this especially designed

RAILWAY LOCOMOTIVE ENGINEER ADVISES DIESEL



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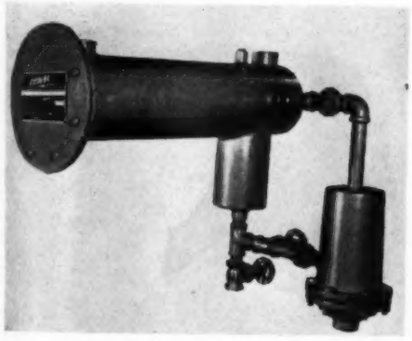

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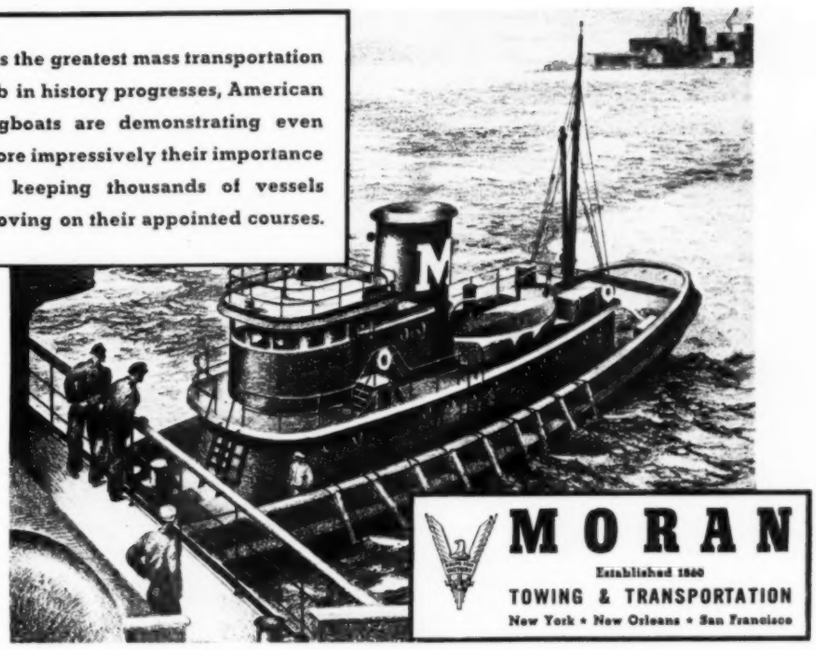

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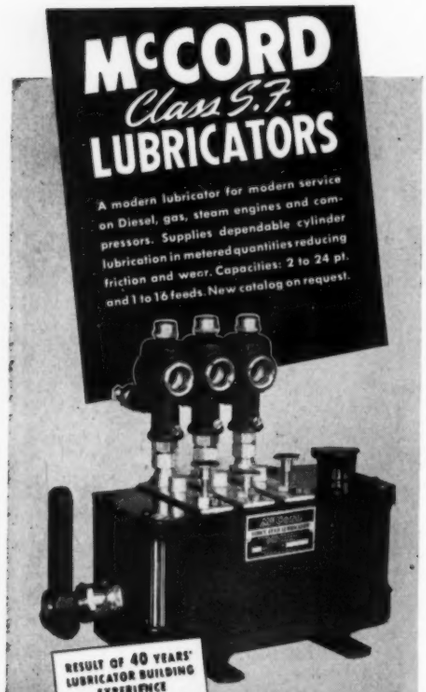
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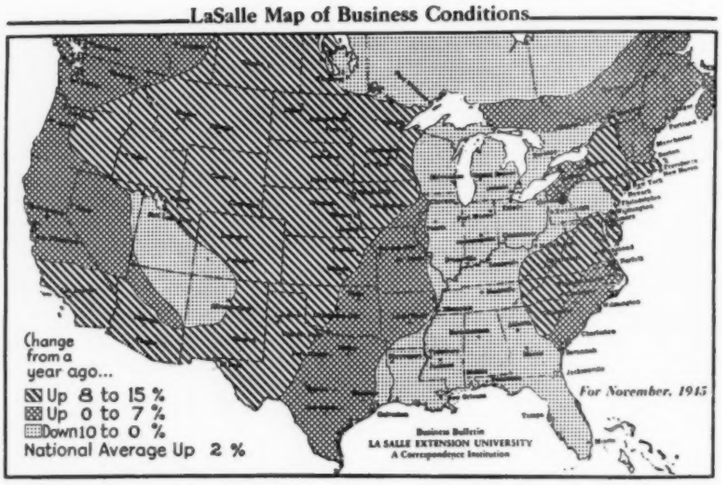
LaSalle Map of Business Conditions


Change from a year ago...
Up 8 to 15 %
Up 0 to 7 %
Down 10 to 0 %
National Average Up 2 %
For November, 1945
Business Bulletin
LA SALLE EXTENSION UNIVERSITY
A Correspondence Institution

Business Volume Still as High as Last Year

Map Supplied by BUSINESS BULLETIN DIVISION of La Salle

Business activity is holding up well even though factory production has declined due to reconversion from war to peace. The total volume of business transactions, which includes sales, production, and financing, remains about 2 per cent above last year and in some communities is even higher. Consumers are buying in large amounts and their purchases offset the drop in productive activity. The current trend in most lines is more favorable than many persons had expected during the early postwar period.

Variations among different industries and different sections of the country are quite as significant as are the changes in the general average. These variations are much more marked than usual because many shifts and readjustments are constantly being made. These readjustments will continue for several months but, unless unforeseen disturbances interfere, by the first part of next year the outlook is for more general stability. Business activity will remain quite a little above prewar levels and somewhat below the peak of the war period.

The most striking change in the LaSalle Map this month is the excellent showing being made in the agricultural sections of the country. An exception is the relatively less favorable trend in many parts of the South where the cotton crop is much below average. Other areas where business is better than the national average are around New York City and Washington. Activities in connection with the demobilization of the armed forces, shipments abroad, and the still extensive operations of the Federal government are factors responsible for the continued high volume of business in those places.

In much of the eastern part of the country and in the industrial region around the Great Lakes business is lagging. Much of the relatively poorer showing in those regions is due to the fact that activity there was exceptionally high last year. War production was being carried on at an enormous rate. Production will pick up again as soon as factories are reconverted and equipped again to turn out peacetime goods. Then output should be large, at least until most of the consumer shortages have been made up. If prices, wages, and costs can be kept in balance a high rate of activity should be maintained indefinitely.

Along the Pacific Coast, business has also been lagging somewhat, although activity is still high as compared with the normal prewar rate. The drop from the peak has been somewhat greater, however, than in many other sections of the country. In spite of this decline, indications are quite favorable that a substantial part of the wartime expansion in industrial facilities will be retained. More factories will continue to operate and a larger percentage of the products used by consumers will be produced within the region than before the war.

In the agricultural regions of the Middle West, conditions are not only better than a year ago but also much more prosperous than in the prewar years. Crops have again been in the bumper class and prices of farm products have held up well. Farm income has more than doubled in recent years and it is holding up very close to the peak. Demand for farm products is very large and will continue that way for many months.

Throughout most of Canada conditions are about the same as they were a year ago. Even though some crops have been less than last year, farm income remains high. Activity has been lagging in the industrial region north of the Great Lakes and throughout much of the East. Reconversion to peacetime production is going ahead rapidly, however, and the large consumer demand will assure a continued high level of business volume. Many readjustments will have to be made, of course, but the outlook is favorable and business will remain far above that of the prewar years.

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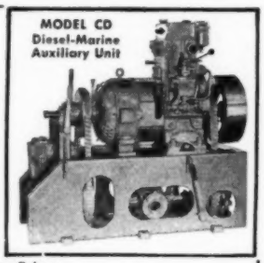

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Cummins Appoints James G. Hull As New Regional Manager

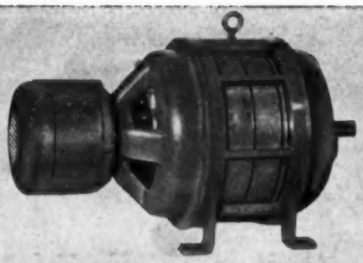
CUMMINS Engine Company, Inc., has announced the appointment of James G. Hull as manager of the Fort Worth region, effective September 1, 1945. Offices for the region, which includes all of the Mid-Continent Area, are located at 1812 Fair Building, Fort Worth 2, Texas.

James G. Hull

Mr. Hull, for the last year a sales engineer at the home office in charge of all oil field accounts, succeeds Jay B. Chambers, who resigned recently to purchase the Denver dealer franchise for Cummins engines. Mr. Hull for six years has been affiliated with Cummins in various capacities, from shop to engineering, and is thoroughly familiar with all types of Diesel engine applications. As a result of his work as oil field sales engineer, he is widely acquainted with operators and equipment manufacturers in the Southwest.

H. C. Ruggles Becomes Secretary of H. O. Penn Machinery Co.

AT a recent meeting of the stockholders of the H. O. Penn Machinery Company, Horace C. Ruggles, better known in the Diesel Engine Field as "Pete" Ruggles, was made Secretary of the company. Mr. Ruggles is head of the Engine Division and is in charge of all "Caterpillar" Marine and Industrial sales and service throughout the territory which includes New York City, Mineola, L. I., N. Y., Poughkeepsie, N. Y. and Newington, Conn. For the past ten years he has been a member of the H. O. Penn



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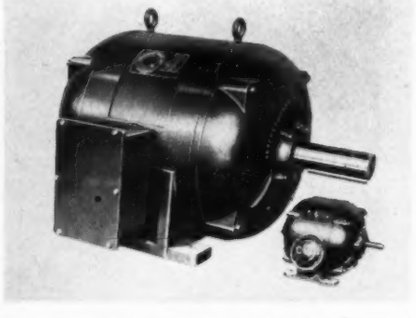
Horace C. ("Pete") Ruggles (Affiliated Photo-Conway)

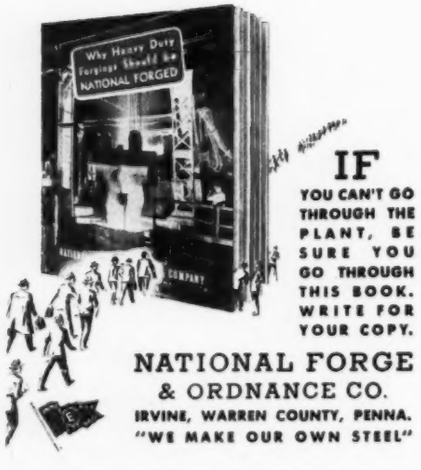
sales staff and was previously identified with the boat building trade as a Marine Engineer and Architect.

Crocker-Wheeler Extend Line of Protected-Type Motors to 200 Hp.

WITH the addition of three new frame sizes, designated as B58-A, B and C, the Crocker-Wheeler Division of Joshua Hendy Iron Works, Ampere, N. J., now offers a complete line of alternating-current, squirrel-cage, Protected Type Motors from 1 to 200 hp. With a 15 per cent service factor, these motors provide full



Two extremes of Crocker-Wheeler Protected Type motors—the B-58 and the smallest of the line, the 203.



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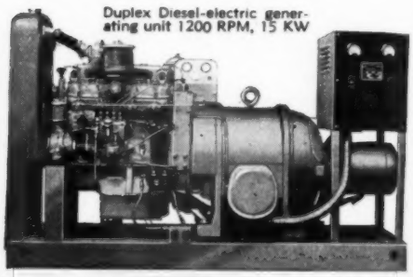

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Whitcomb Appoints R. O. Nash St. Louis District Manager

R. O. NASH has been appointed St. Louis District Manager for the Whitcomb Locomotive Company in charge of Sales and Service activities. A graduate of the University of Minnesota with a Degree in Electrical Engineering, he joined the Test Department of General Electric Company, later serving a special apprenticeship in the Mechanical Department of the C.M.St.P. and P.R.R.

R. O. Nash

Following a period on special assignment in the Car Department, he left the railroad in 1927 to accept a position as Railway Equipment Engineer with the Westinghouse Electric & Manufacturing Company, participating in the early development of Diesel Electric Motive Power for railroads and industry. In 1930 he was transferred to the South Philadelphia Works as Resident Engineer in connection with all locomotive assembly and construction; also acting in the capacity of Field Engineer in the Philadelphia territory until 1936, when he moved to St. Louis, Missouri to become an Industrial and Transportation Sales Representative in the Southwestern District for Westinghouse; and in 1940 was appointed Supervisor of Maintenance Sales for the Southwestern District. Mr. Nash left the Railroad Div. of Socony Vacuum in July to join Whitcomb.

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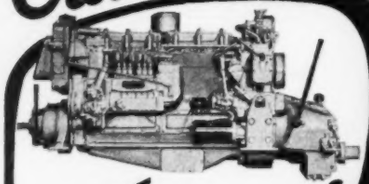

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O.K. of a Great Critic...

A WHOLE PLANTFUL OF THEM WHO BUILD MOTORS TO SATISFY EXACTING BUYERS!

Other plants may turn out *more* motors than the Star Plant. But you'll find no *better* motors . . . for when you see the Star Trademark you see the "O.K." on the efforts of hundreds of meticulous craftsmen working to critical standards.

Among them are the men who own the company. For Star's owners are born motor men, and the place to find them is out in the plant or around a drawing board, helping to make Star Motors as good as they can be.

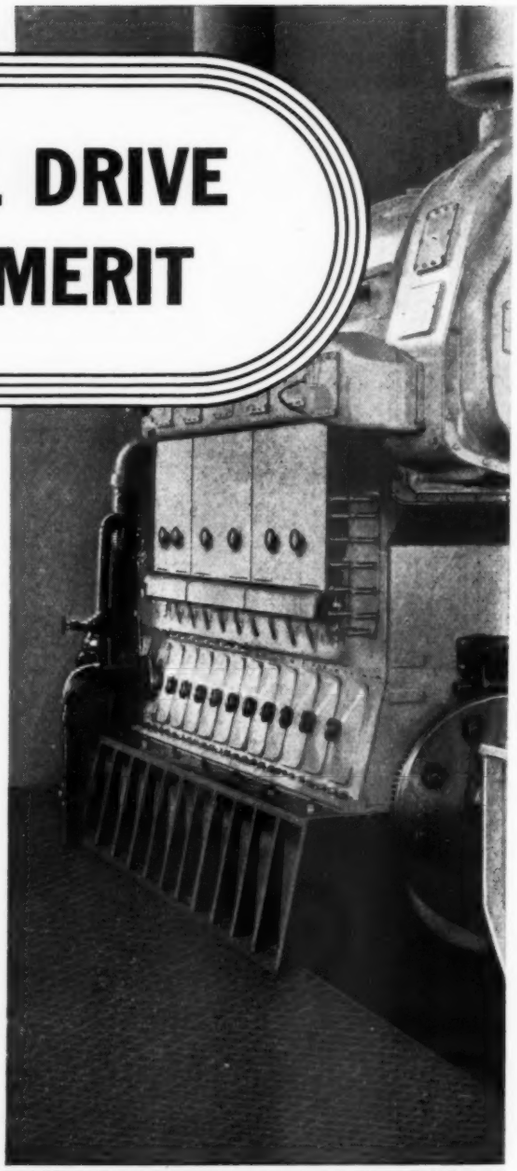
Everybody at Star is exacting about quality . . . in design, materials, workmanship. There's a craftsman's spirit everywhere that words can't cover. But motor buyers who visit us always comment on it. And exacting motor users recognize that Star does things a bit better by specifying Star where a motor must be better than "good enough".

WRITE FOR 8-PAGE DIGEST. It outlines Star Motors (⅛ to 200 HP) and Generators (to 150 KW) . . . names hard-to-satisfy buyers who are long-time customers . . . tells how Star becomes the "Motor Department" for customers. Star Electric Motor Co., 232 Bloomfield Ave., Bloomfield, New Jersey.

STAR MOTORS

POWER PACKAGED AS YOU NEED IT

MULTIPLE-DIESEL DRIVE HAS *Proved* ITS MERIT



THOUSANDS of wartime installations, totaling millions of horsepower, prove the efficiencies and economies of Fairbanks-Morse multiple-Diesel drive for ships requiring 2,000 or more horsepower.

They cost less to install.

The ideal propeller shaft speed can be used.

With reversible engines, the more highly efficient mechanical drive can be employed.

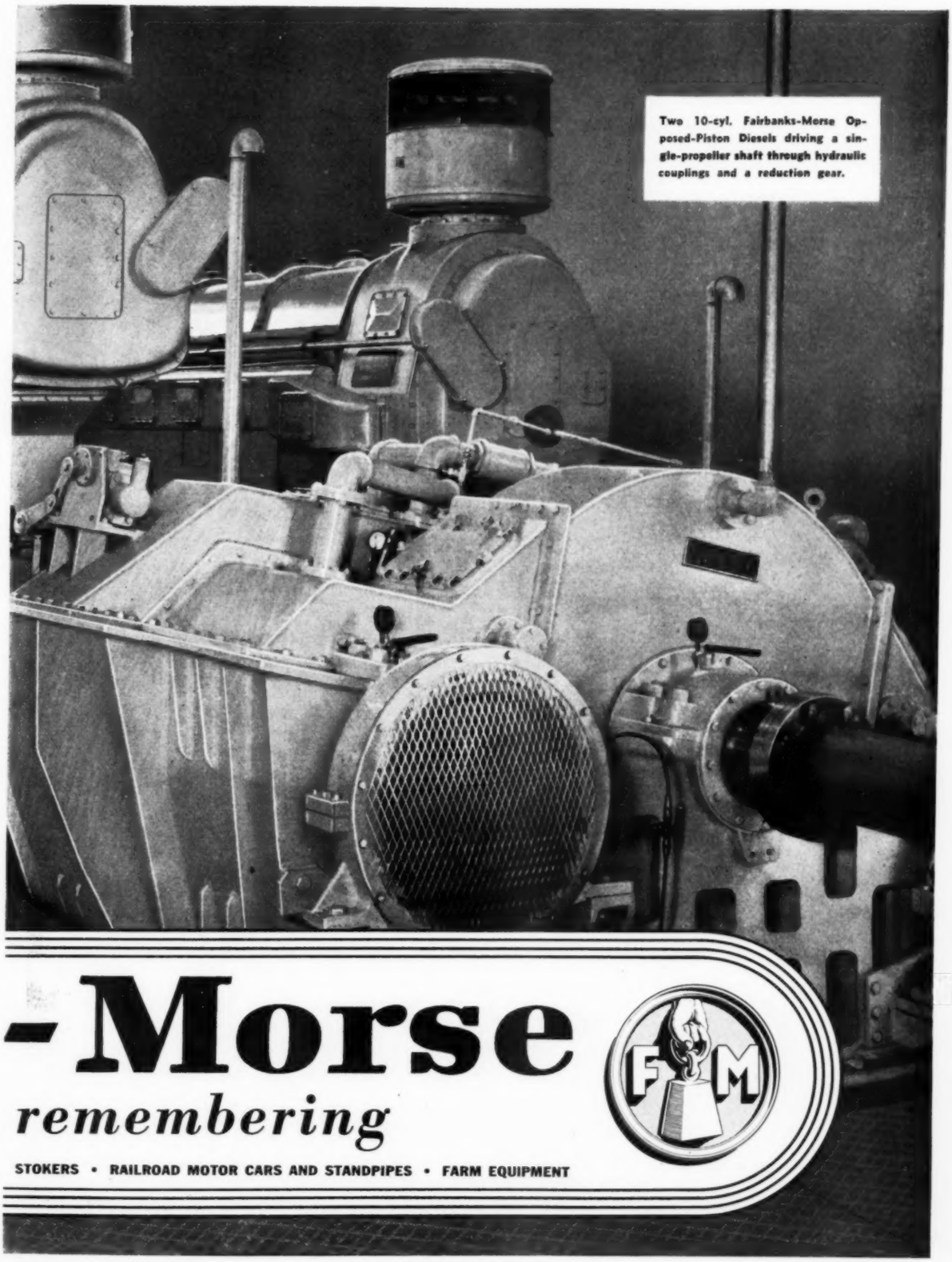
We have supplied more than three million horsepower of Fairbanks-Morse Opposed-Piston Diesels for mechanical and Diesel-electric multiple-engine drive.

To apply this valuable experience to your problems, write Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Ill.

Fairbanks

A name worth

DIESEL LOCOMOTIVES • DIESEL ENGINES • GENERATORS • MOTORS • PUMPS • SCALES • MAGNETOS



Two 10-cyl. Fairbanks-Morse Opposed-Piston Diesels driving a single-propeller shaft through hydraulic couplings and a reduction gear.

-Morse

remembering

STOKERS • RAILROAD MOTOR CARS AND STANDPIPES • FARM EQUIPMENT

Ever See a *Conscience* being *Assembled?*

ONE OF THE REASONS 6 OUT OF 10 PICK U. S. GAUGES

WHY A GAUGE DOES RIGHT BY YOU

What you prize most in a gauge is accuracy. U. S. Gauges, like all self respecting U. S. instruments, "tell the truth." One reason: they have a marvelous mechanical "conscience," a movement you can count on, made to tolerances as low as .0005", even when gang assembled!

All U. S. gauge movements are built wholly within the shop of U. S. Gauge.

WHY 6 OUT OF 10 CHOOSE U. S. GAUGE

The assembly of a gauge movement weds a number of small, precisely made parts . . . but it's only one step in U. S. gauge-making. Secret of the preference for U. S. Gauges is the application of *Manufacturing Control* to all steps . . . from raw material to production, assembly, calibration, testing, inspection. Over 6 out of 10 original equipment buyers choose U. S. G.

US Gauges

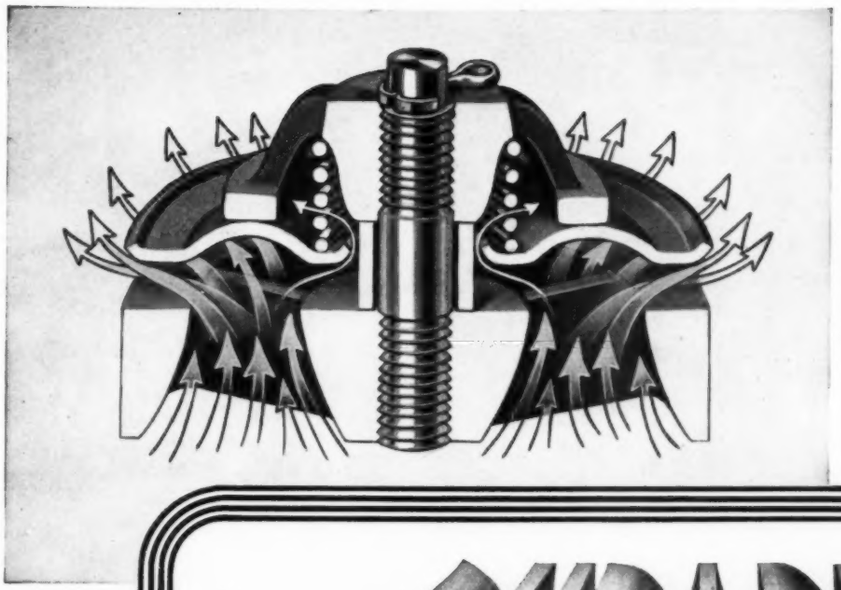
RUSH ON FOR COPIES of BIGGEST GAUGE CATALOG

The demand for copies of this new U. S. Gauge catalog exceeds all estimates. 102 Pages. Gauges and gauge movements, gauge manufacture. Logically arranged and cross-referenced. Special easy-to-use features for saving your reading time. Just send a request on your business letterhead for your copy—no obligation.

UNITED STATES GAUGE
DIVISION OF AMERICAN MACHINE AND METALS, INC.
SELLERSVILLE, PA.
Manufacturers of Pressure, Temperature, Flow, and Electrical Measuring Instruments

U.S. INSTRUMENTS Tell The Truth

USG



No reciprocating pump is more efficient than its valves and valve performance is dependent on the method utilized to close the valves.

DURABLA

VALVE UNITS UTILIZE PROTECTED, SELF-CLEANING, LONG LIFE SPRINGS

DURABLA Valve Units* utilize springs to return the valve member to the seat. DURABLA design completely eliminates the usual objections to the use of springs. This permits substantial reduction in weight; more compact installation; and greater flexibility in location of the valve service. Non-spring-actuated valves and other types of spring-actuated valves do not offer these advantages.

1. The DURABLA Valve Spring is normally never compressed more than 50% of its length due to the protection of the spring guard. The coils of the spring never touch when the spring is in compressed position.
2. The DURABLA Valve Spring is self-cleaning as by virtue of the open type spring guard it is exposed to the fluid flow.
3. DURABLA Valve Springs operate effectively at 3000 rpm (6000 motions of the valve per minute) and higher.
4. The protection of the DURABLA Valve Spring permits lighter spring pressure, thereby reducing energy required to open the valves.

DURABLA Protected Self Cleaning Valve Springs are just one of the characteristics of DURABLA Valve Units which are an implicit guarantee of high efficiency, long life and long term economy.

Address DURABLA Engineering Department for Information and Bulletin; Reference **9P12**

*Patent Numbers 2090486, 2117504

DURABLA MANUFACTURING COMPANY
114 LIBERTY ST. NEW YORK
BRANCHES IN PRINCIPAL CITIES. FOR CANADA REFER: CANADIAN DURABLA LIMITED, TORONTO

KEEP AMERICA STRONG—BUY VICTORY BONDS

LET'S BEGIN AT THE *FINISH*

THE jewel-like finish of Allison precision bearings tells you that here is precision.

And if you are up on "micro-finish," the figures will interest you.

Allison precision bearings are surfaced to 20 micro-finish or lower. That's better than five times as smooth as good grinding.

Allison bearings are super-accurate too. They are tested for accuracy under actual working pressure.

These steel-back bearings have a perfect bond of steel and bearing metal—to take shock and run cool. Allison pioneered this science—has been making precision bearings for over 20 years.

Your engine or your machine tool is worthy of these finer, longer-lived bearings. Why not let Allison engineer them for you?

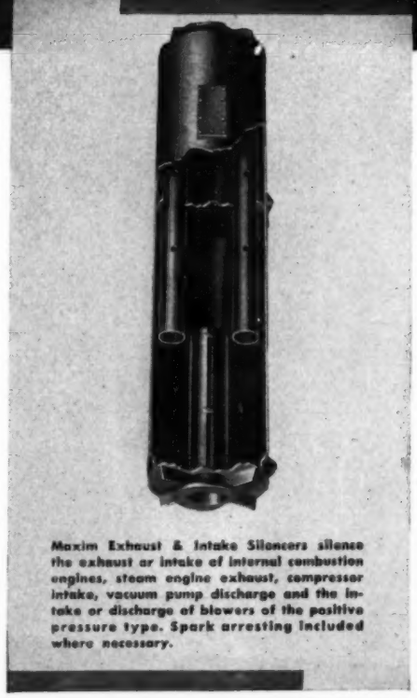
Allison

DIVISION OF GM GENERAL MOTORS

Indianapolis, Indiana

MAKERS OF THE FAMOUS *Allison* LIQUID-COOLED AIRCRAFT ENGINES

KILL ENGINE EXHAUST NOISE WITH MAXIM SILENCERS



Maxim Exhaust & Intake Silencers silence the exhaust or intake of internal combustion engines, steam engine exhaust, compressor intake, vacuum pump discharge and the intake or discharge of blowers of the positive pressure type. Spark arresting included where necessary.

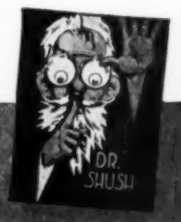
Adequate silencing of engine exhaust noise is an operating necessity today. The engines shown above could, without proper silencing, make a public disturbance that would quickly be felt by those in charge of plant operation. With Maxim Silencers, however, exhaust noise can be reduced to a point where it is scarcely audible.

Maxim engineers will be glad to recommend the correct silencing equipment to best meet your particular problem. Send your specifications to the address given below.

Maxim also makes Heat Recovery Silencers which combine efficient silencing, spark arresting, and the recovery of waste exhaust heat to produce steam or hot water for heating or processing operations. These are described in Heat Recovery Bulletins WH 100, WH 101 and WH 103.

WRITE FOR BULLETINS describing exhaust & intake silencers D 125, D 127, D 101, D 37.

THE MAXIM SILENCER CO. 94 HOMESTEAD AVE., HARTFORD, CONN.



ARMY E NAVY

MAXIM

Sealed Power's Multiple Leadership in the Diesel Field

a **PISTONS**

1 Pistons for Original Equipment
and
2 Pistons for Replacement!

b **SLEEVES**

1 Sleeves for Original Equipment
and
2 Sleeves for Replacement!

c **PISTON RINGS**

1 Piston Rings for Original Equipment
and
2 Piston Rings for Replacement!

Builders of Diesel engines for trucks, tractors, marine installations and heavy construction equipment long ago learned to rely on Sealed Power laboratories, engineering, production facilities and craftsmanship.

Sealed Power motor parts are now available for replacements, also, through hundreds of America's most progressive distributors.

Whether you build Diesel engines or operate Diesel engines, Sealed Power experience and facilities are at your disposal in piston rings, pistons and cylinder sleeves.

SEALED POWER CORPORATION

Muskegon, Michigan — Windsor, Ontario

Piston Rings, Pistons, Cylinder Sleeves, Piston Pins, Valves, Water Pumps, Bolts, Bushings, Tie Rods, Front End Parts.

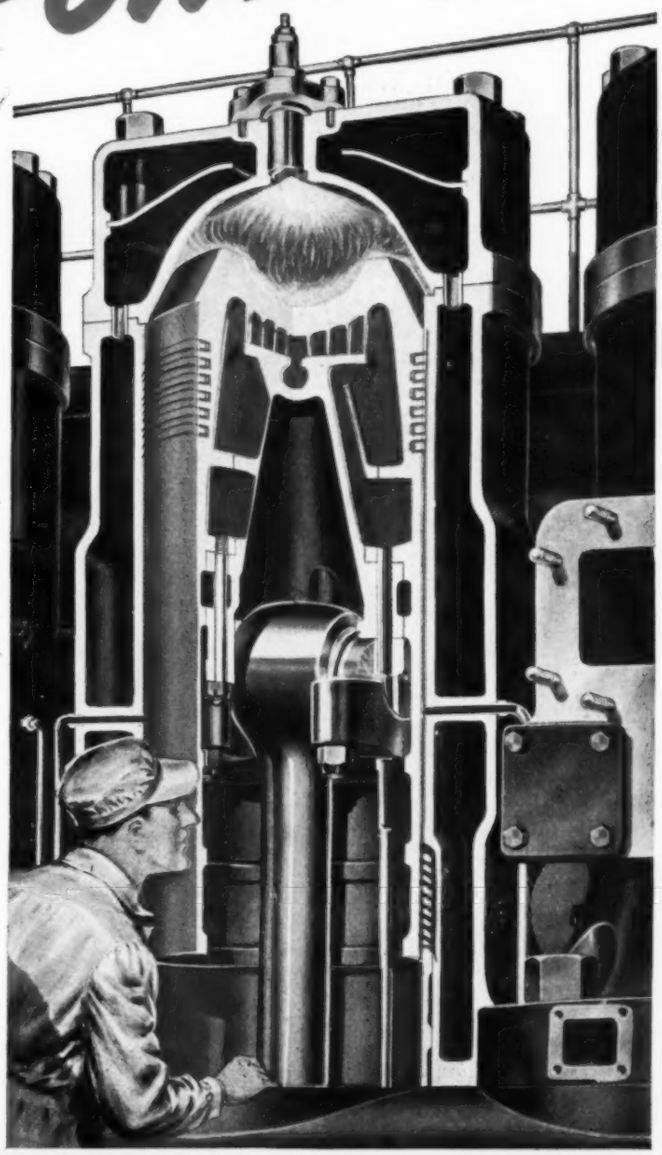
●

Keep Your War Bonds—Get $4 for $3

SEALED POWER PISTON RINGS

PISTONS — CYLINDER SLEEVES

ONE WAY TO GET FULL POWER!



Make Certain Your Diesel Lubricating Oil Will Keep Rings Free, Prevent "Blow-by"!

HERE, in the ring zone of your Diesel engine, combustion makes things plenty hot. Unless your lubricating oil can take this heat, it will "cook," form hard deposits that cause ring sticking.

Loss of valuable power due to "blow-by" is the inevitable result.

Gargoyle D. T. E. Oils Nos. 1 to 5 are specially designed to withstand the terrific heat in Diesel ring zones . . . to keep rings free.

These famous oils reduce deposits to an absolute minimum, and those that do form, are soft and flaky.

Just as important, these Gargoyle D.T.E. Oils provide strong films that resist rupture and reduce wear on pistons, cylinders and rings.

You get full power — and your Diesel stays on the job longer with less "down-time" for repairs and replacements.

SOCONY-VACUUM OIL CO., INC.

Standard Oil of N. Y. Div. • White Star Div. • Lubrite Div. • Chicago Div. • White Eagle Div. • Wadhams Div. • Magnolia Petroleum Co. • General Petroleum Corporation of California.

GET CORRECT LUBRICATION FOR YOUR ENTIRE PLANT WITH SOCONY-VACUUM ENGINEERING

GARGOYLE Lubricants

Socony-Vacuum's FIVE STEPS to Lower Production Costs for You

1. Lubrication Study of Your Entire Plant
2. Lubrication Schedules and Controls
3. Lubricant Storage and Handling System
4. Skilled Engineering Counsel
5. Progress Reports of Benefits Secured

Ferries that Purr!

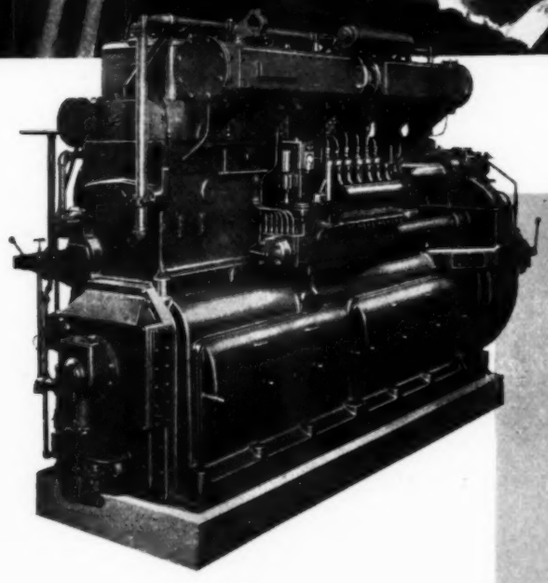
There's a lesson for power-interested men in these modern ferries, for which ALCO diesel engines furnish smooth, purring power—quick, dependable power—plus space saving for more pay load!

CLEAN, smokeless power—fast, dependable and almost silent—from ALCO diesel engines—moves these finer ferries of today.

Gone are the murk and dirt inseparable from boiler firing. Light-weight, high-speed, compact, heavy-duty diesel engines of greater dependability, pioneered by ALCO, have ended all need for tolerating this nuisance.

Ashore or afloat, more than a million and a half horsepower of ALCO diesel engines, in hundreds of applications, are proving conclusively the superiority of this better power supply . . . always instantly available.

Plan now to make use of ALCO diesel engine advantages for your power requirements, marine or stationary.



American Locomotive

ALCO DIESEL ENGINES

For Universal Application

30 Church Street, New York 8, N. Y.

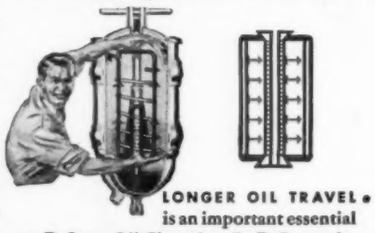
Engine Destroying, Power Wasting Sludge *MUST* be STOPPED from being *BORN!*

WHAT you SEE on your oil filter cartridge is also in your engine! That's why it's so important that you watch that tattletale filter cartridge . . . it tells you what is going on inside your engine.

Remember, too, that sludge in a filter cartridge is no indication of filtering efficiency. The most important thing a filter can do is to get at the sludge, etc. *before* it can be born! DeLuxe does this by removing the asphaltenes and other harmful elements before they can combine to form sludge, varnish, resins, etc.

Of interest to operators, maintenance men, plant superintendents, industrial executives and engine manufacturers is the complete story of DeLuxe, the oil filter that is more than a *"sludge catcher"* but is a *"sludge preventer"*. WRITE FOR FREE BOOKLET TODAY. DeLuxe Products Corp., 1416 Lake Street, La Porte, Indiana.

1379 DP



LONGER OIL TRAVEL is an important essential to DeLuxe Oil Cleansing. In DeLuxe, the oil goes the long way from bottom to top, instead of the short travel route from side to center or center to side.

DELUXE *Oil Filter*

DOES MORE THAN STRAIN OIL . . . MORE THAN FILTER OIL
ACTUALLY CLEANSES OIL

Also manufacturers of Cast Iron Pistons of special lightweight design; standard equipment with over forty manufacturers.

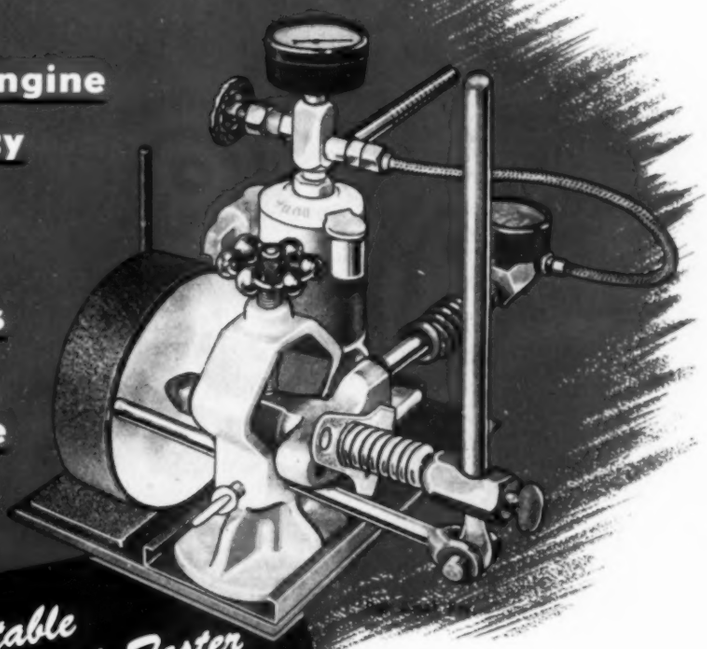
TEST DIESEL NOZZLES REGULARLY

for . . .

top engine efficiency

lower repair costs

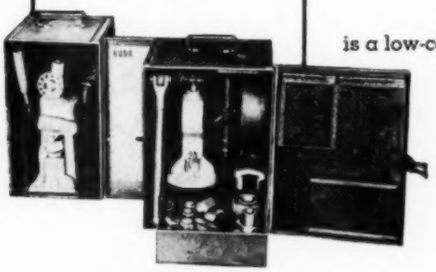
less engine down-time



use the Buda portable Universal Diesel Nozzle Tester

A few minutes at regular intervals to test diesel nozzles [illegible] insurance against expensive delays for repairs and the possibility of long periods of sub-standard engine performance due to faulty nozzle operation. With the Buda Portable Universal Diesel Nozzle Tester, you can make quick, accurate tests for leaky valves, faulty spray patterns, sticking needle valves and dribbling nozzles on any type of standard diesel nozzle . . . *at the engine.* Easy to carry, set up and use, the Buda Nozzle Tester is a low-cost precision instrument, built to Buda quality standards. Write to BUDA for complete details.

Two light metal boxes all you have to carry to test all standard diesel nozzles!

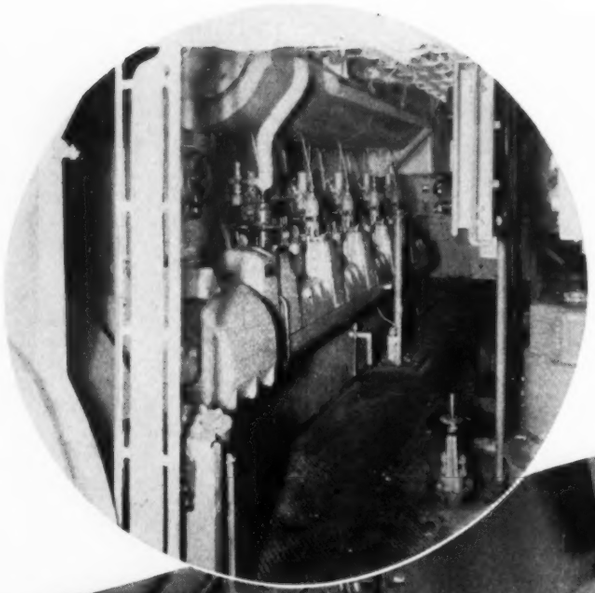


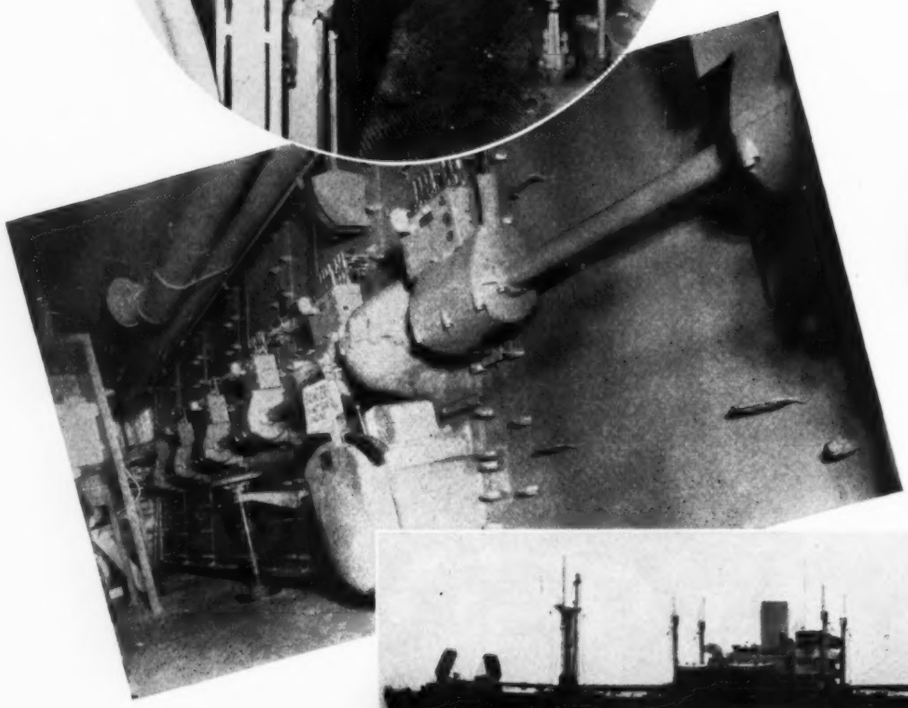
ARMY NAVY

BUDA

BUDA Model 2215-SB "All-Purpose" Jacks

15402 Commercial Avenue
HARVEY *(Chicago Suburb)* ILLINOIS





8500 HORSEPOWE

ON Satco

BEARINGS

*Trade Mark Registered.

Three big Nordberg Diesels power the new U. S. Maritime Commission Ship EMORY VICTORY—the main engine of 6000 S.H.P. and two auxiliaries of 1250 H.P. each—all Satco*-equipped. The main engine—the largest of its kind ever built in this Country—is an outstanding example of engineering and manufacturing skills and the selection of Satco* bearings for it follows traditional practice based on long and satisfactory experience. Yes Satco* bearings *are* traditionally accepted in America's Leading Diesels.

AMERICAN BEARING CORPORATION

AFFILIATED WITH NATIONAL LEAD COMPANY

INDIANAPOLIS — CENTRIFUGAL American Bearings FORCE — INDIANA

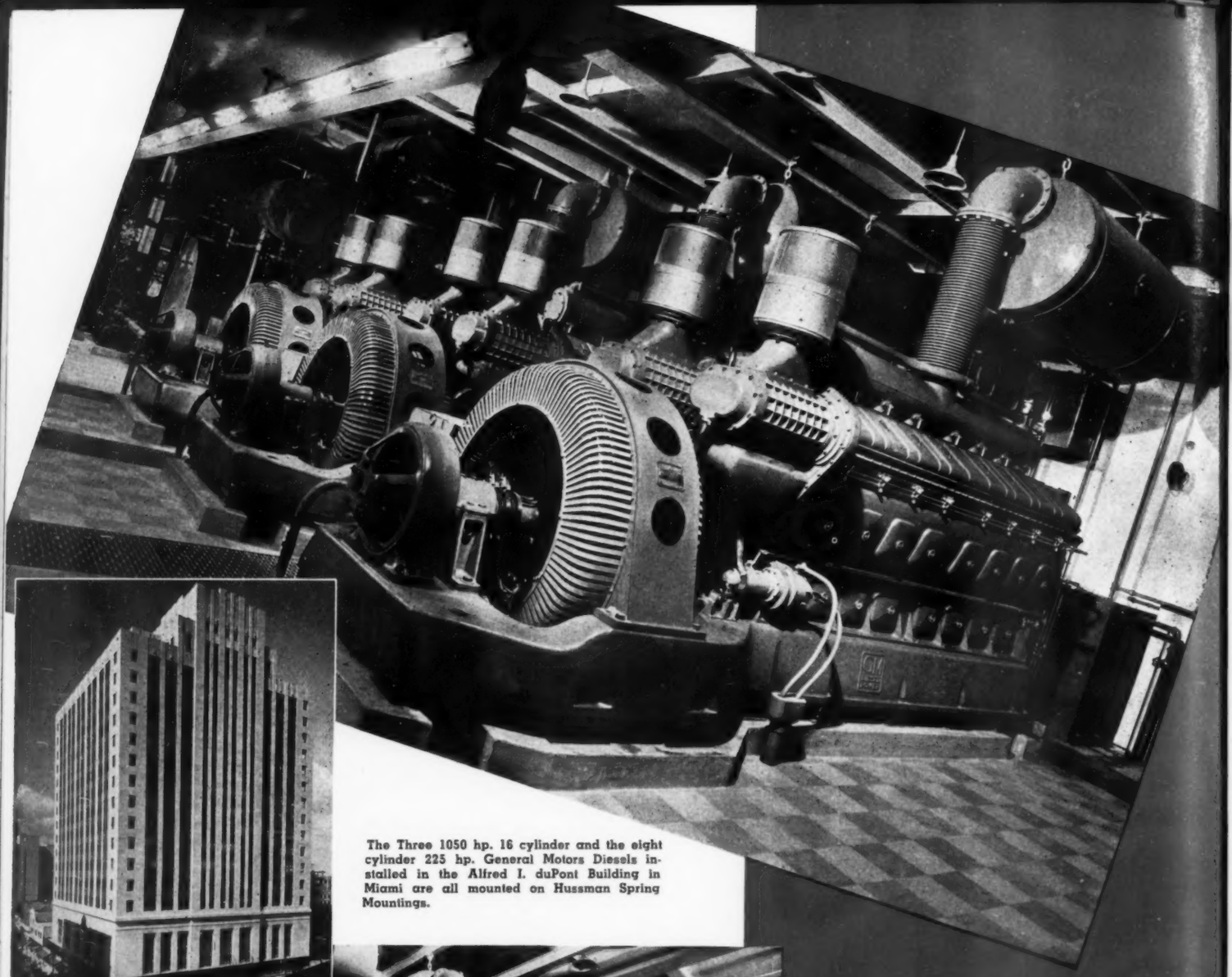
The Gentleman is Holding a Thin Blonde Hair

Can't see it? Few could see a thin blonde hair held before them! But when intricate electrical equipment calls for working to tolerances that defy the eye, craftsmen of Leece-Neville never miss. In over 35 years of designing and building electrical equipment, Leece-Neville has always maintained a high standard of precision. And this precision—in engineering and manufacturing—is one of the reasons Leece-Neville products are famous everywhere for their outstanding performance. To get the *best* in Diesel starting equipment—for conventional or special requirements—see Leece-Neville first. *The Leece-Neville Company, Cleveland 14, Ohio.*

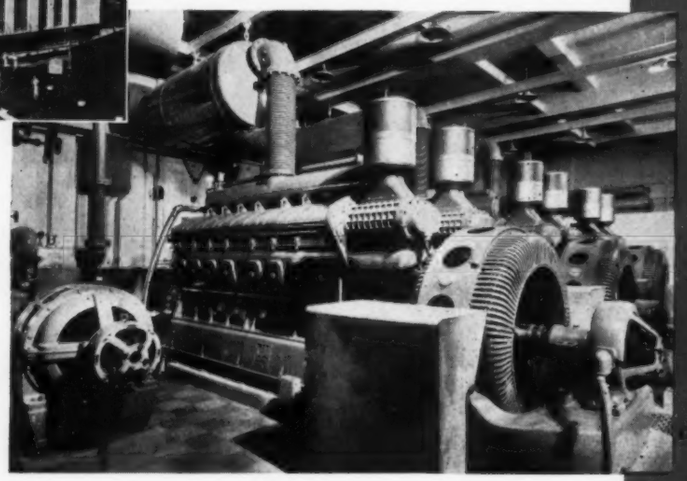
LEECE-NEVILLE

Pioneer and STILL Quality Leader

CRANKING MOTORS • GENERATORS • VOLTAGE REGULATORS • SWITCHES



The Three 1050 hp. 16 cylinder and the eight cylinder 225 hp. General Motors Diesels installed in the Alfred I. duPont Building in Miami are all mounted on Hussman Spring Mountings.



THREE thousand three hundred seventy-five horsepower of Diesel Engines in one plant, all mounted on Hussman Spring Mountings. The largest plant yet installed in this manner, in the largest building dependent entirely upon Diesel engines for all its power and light requirements. Thus Hussman Spring Mountings contribute their share to opening up this new market for Diesel engines, by isolating machinery vibrations from the rest of the building, by simplifying and reducing the cost of foundations. Submit your vibration problems to us.

CARL HUSSMAN

Equipment for the Isolation of Vibration and Noise

3001-07 North Oakley Blvd.,
Chicago, Ill.

THE IMPORTANCE OF *Centrifugal* CASTING

Foundry mechanization exemplified! This painting by the famous artist, Rudi Schmid, portrays the spinners in action at C.W.C. (Lansing Plant) Full-color reproductions, size 12 5/8" x 9 11/16", suitable for framing, may be had upon request.

CAMPBELL,
WYANT & CANNON
FOUNDRIES

MUSKEGON, MICHIGAN
Henry Street Plant
Sanford Street Plant
C. W. C. Crankshaft Corp.

•

SOUTH HAVEN, MICHIGAN
National Motor Castings Co.

•

LANSING, MICHIGAN
Centrifugal Fusing Co.

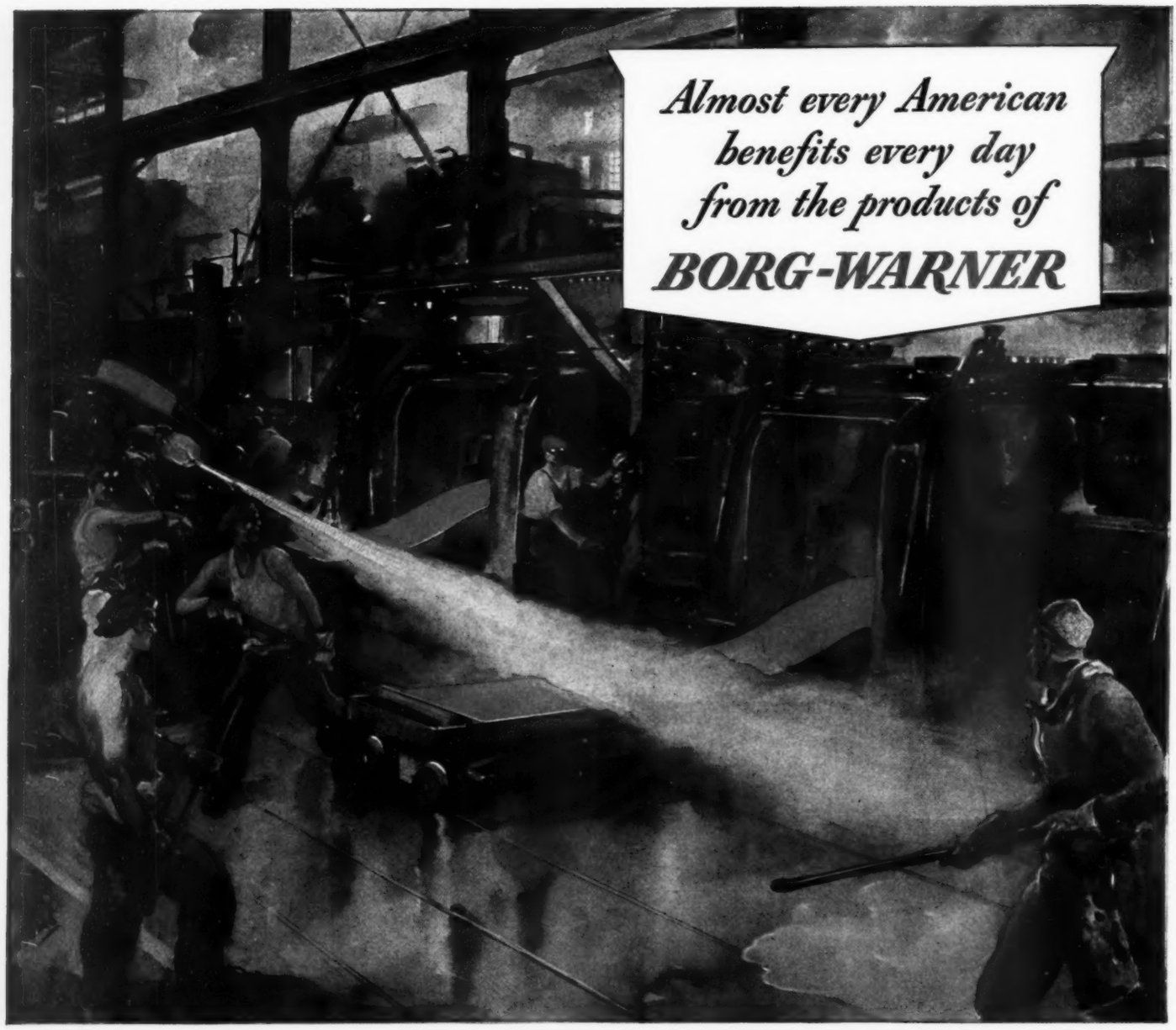
•

BETTENDORF, IOWA
Ordnance Steel Foundry Co.

One of the many C.W.C. casting triumphs is the manufacture of Centrifuse brake drums. By this process, the braking surface consisting of a layer of alloyed iron is centrifugally fused into the steel drum shell. It is the only completely satisfactory brake drum for aircraft and is now widely used in automotive vehicles.

PRODUCTS OF C.W.C. METALLURGICAL ENGINEERING:
Cylinder blocks, cylinder heads, "Proferall" cast crankshafts and camshafts, "Centrifuse" brake drums, acid proof cylinder inserts, and centrifugally cast cylinder liners and sleeves. In addition to the above products, C.W.C. has facilities for producing Electric Furnace Alloyed Steel.

CAMPBELL, WYANT & CANNON FOUNDRY CO., MUSKEGON, MICHIGAN



"SWORDS INTO PLOWSHARES" *as painted by James Sessions at the Ingersoll Steel & Disc Division at West Pullman, Illinois. Of the many interesting operations in this plant perhaps the most colorful is this rolling of high-carbon steel used in manufacturing disc plows, disc harrows, cultivators and grain drills. This great Borg-Warner unit is the world's largest producer of tillage steel for the farm implement industry.*

Makers of essential operating parts for the automotive, aviation, marine and farm implement industries, and of Norge home appliances.

Down any country road you drive the chances are that the farm equipment in the fields is using Borg-Warner parts. For the making and shaping of tillage steel are special arts in which the Ingersoll Steel & Disc Division has pioneered for generations.

However, helping the nation to grow its "daily bread" is just one of many fields in which Borg-Warner plays an important role. The products and engineering ingenuity of Borg-Warner's 28 plants benefit almost every American every day. For example, Borg-Warner parts are found on 9 out of 10 farms, in 9 out of 10 airplanes and 9 out of 10 makes of automobiles. And Norge refrigerators, ranges and washing machines bring better living to millions of homes.

Innumerable great new advances by Borg-Warner will reveal themselves as American industry converts to peacetime production. For, then as now, Borg-Warner's guiding principle, "Design it better, make it better," will work in many ways to bring you ever better products at ever lower costs.

ENGINEERING B-W PRODUCTION

These units form Borg-Warner: BORG & BECK • BORG-WARNER INTERNATIONAL • BORG WARNER SERVICE PARTS • B-W SUPERCHARGERS, INC. • CALUMET STEEL DETROIT GEAR • DETROIT VAPOR STOVE • INGERSOLL STEEL & DISC • LONG MANUFACTURING • MARBON • MARVEL-SCHEBLER CARBURETER • MECHANICS UNIVERSAL JOINT • MORSE CHAIN • NORGE • NORGE MACHINE PRODUCTS • PESCO PRODUCTS • ROCKFORD CLUTCH • SPRING DIVISION • WARNER AUTOMOTIVE PARTS • WARNER GEAR

Here is a power unit that has really "been around"

From Alaska to the far reaches of the Pacific . . . in India, China and other remote parts of the world where permanent power installations are not feasible . . . Delco generators have been coupled with America's great Diesels to provide light and power.

Lightweight and compact, designed on the single-bearing principle, with a steel driving disc piloted directly into the engine flywheel, Delco generators have established an enviable record for efficient and dependable operation . . . have won the respect of electrical engineers wherever they were coupled with the rugged Diesel engines.

DELCO GENERATORS
are coupled with
AMERICA'S GREAT DIESELS

BUY VICTORY BONDS

DELCO PRODUCTS
DAYTON, OHIO

DELCO PRODUCTS DIVISION
GENERAL MOTORS CORPORATION

DELCO PRODUCTS
DAYTON, OHIO

S-M-O-O-T-H PERFORMANCE...

...10 years of low cost POWER and dependable lubrication with

TYCOL DIESEL OIL

Thirteen Diesel Engines, operating under eleven different service conditions for one large company, are all lubricated by Tycol Diesel Oil. Result? According to their chief engineer . . . with Tycol DIESEL OIL their cost of lubrication for all operations combined was the lowest on record.

Furthermore, with oils formerly used, crankcases and pistons were soon coated with a layer of difficult-to-remove varnish . . . resulting in greatly decreased efficiency and increased operating costs.

Trouble and money-wasting expense was banished by Tycol DIESEL OIL. There are many other saving-benefits that will interest every Diesel Operator. Let a Tide Water Associated engineer give you the full story. Ask for the information today.

DRUMS! DRUMS! DRUMS!

Today's needs make it imperative that all empty drums be returned immediately.

TYCOL INDUSTRIAL

ENGINEERED FOR EVERY

M-A-X-I-M-U-M EFFICIENCY

with TYCOL

ENGINEERED LUBRICATION

Under all conditions the proved performance of Tycol lubricants more than meets their recommended service.

Rigidly controlled and tested during manufacture . . . and refined from the highest grade crudes, Tycol oils and greases (whether straight mineral or compounded) retain their uniformity* within each classification — from the first drum to the last. This unvarying high quality, plus the scope of the line, accounts for Tycol's wide acceptance among operators interested in maximum production . . . top efficiency . . . lowest operating cost.

Whatever your lubrication need, there is a Tycol oil or grease expressly engineered to afford greater economy . . . longer machine life for every type of equipment. Let a Tide Water Associated engineer help you select the best one for your particular need. Call, write or wire your nearest Tide Water Associated Office for full details.

Makers of Famous Veedol Motor Oil

*** UNIFORMITY.** For clear, concise descriptions of the basic tests used to determine important lubrication properties — Pour Point, Extreme Pressure, Uniformity and many others — consult Tide Water Associated's informative handbook "Lubricania". For your FREE copy write: Tide Water Associated Oil Company, 17 Battery Place, New York 4, N. Y.

LUBRICANTS
SERVICE NEED

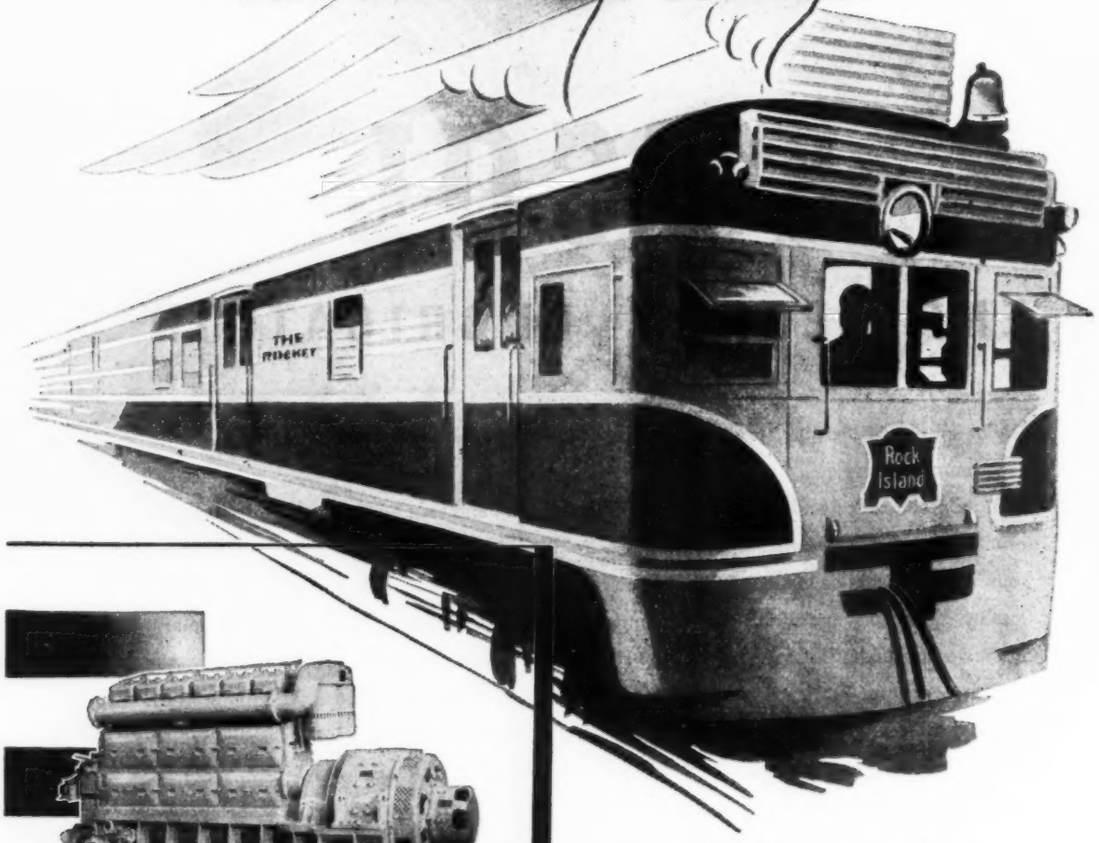
TIDE WATER ASSOCIATED OIL COMPANY
17 BATTERY PLACE · NEW YORK 4, N. Y.

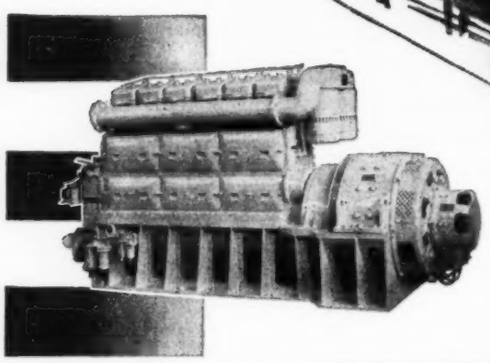
PRINCIPAL OFFICES
BOSTON · PHILADELPHIA
PITTSBURGH · CHARLOTTE, N. C.

MODERNIZE YOUR RAIL CARS

WITH HAMILTON DIESELS

FOR SAFETY AND ECONOMY





Hamilton 400 H. P.
900 R. P. M.—4 Cycle Diesel Engine adapted to original rail car generator with fabricated steel sub-base.

1. No change in sub-base mounting dimensions!
2. Use present starting and generating equipment!
3. Reduce fuel cost!
4. Eliminate fire hazard!

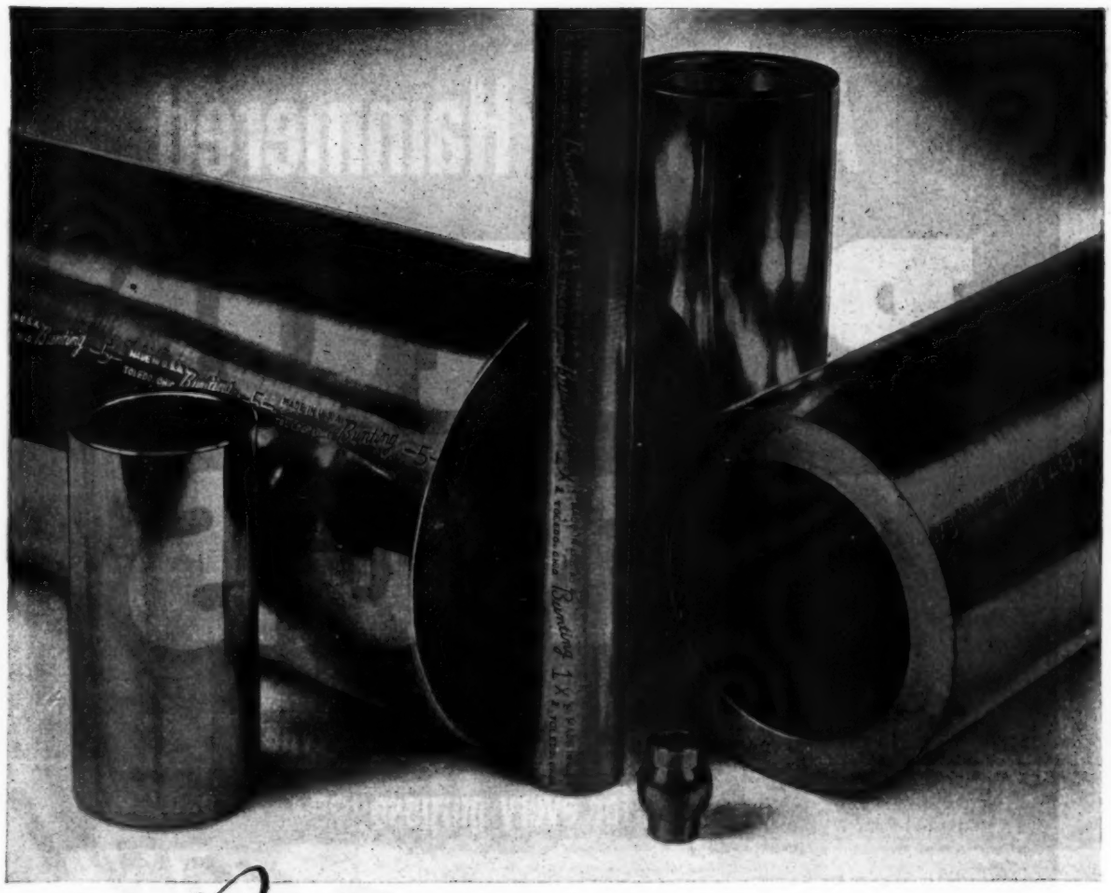
Present your conversion problems to HAMILTON

GENERAL MACHINERY CORPORATION

GENERAL MACHINERY CORPORATION

HAMILTON, OHIO

THE NILES TOOL WORKS CO. • THE HOOVEN, OWENS, RENTSCHLER CO. • GENERAL MACHINERY ORDNANCE CORPORATION



Recognized advantages of Bunting Cast Bronze Bearings and Bars are maintained and increased by advanced metallurgy and manufacturing processes. These finer bronze bearings and bars are available in many different stock sizes from Authorized Bunting Distributors everywhere. Ask your Distributor for Catalog giving complete listing. For Special bearings, to your own dimensions and alloys, write our factory direct. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches in principal cities.

30

Bunting

BRONZE BEARINGS ☆ BUSHINGS ☆ PRECISION BRONZE BARS

American Hammered
PISTON RINGS

in every size . . . of every type

for every purpose

AVAILABLE NOW!

You can get all the American Hammered Piston Rings you need, in any size . . . of any type . . . for any purpose . . . just as promptly as you did in pre-war years.

You'll find that these new rings reflect a quarter-century of peacetime skill and experience and *another* quarter-century of experience and progress that was crowded, by the needs of the nation, into five years on the calendar.

Wartime accomplishments include the production or perfection of such revolutionary new developments as the wear-banishing "PORUS-KROME" *treatment, and the life-extending, performance-boosting high-tensile alloys.

Let us demonstrate that now as in the past, American Hammered Piston Rings plus American Hammered engineering service give the answer to every ring need.

KOPPERS COMPANY, INC.

American Hammered Piston Ring Division

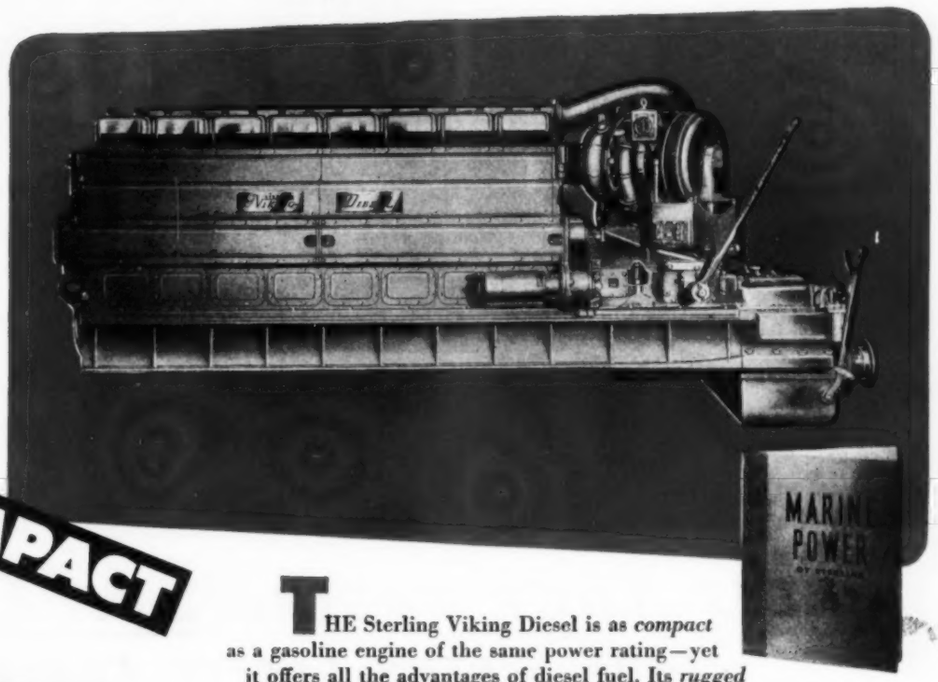
Baltimore 3, Maryland

* VAN DER HORST PROCESS

KOPPERS

THE INDUSTRY THAT SERVES ALL INDUSTRY

A three word description of the STERLING *Viking Diesel*



COMPACT

RUGGED

DEPENDABLE

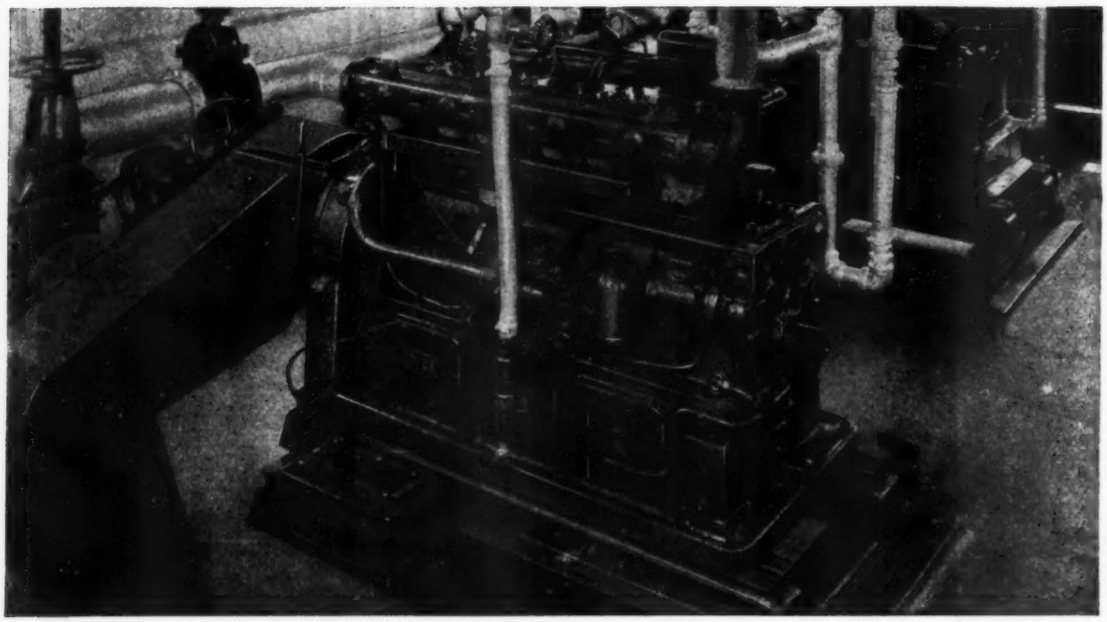
THE Sterling Viking Diesel is as *compact* as a gasoline engine of the same power rating—yet it offers all the advantages of diesel fuel. Its *rugged* construction enables it to take heavy duty punishment—for into it has been built the stamina to give long years of *dependable*, trouble-free, economical service.

Some of its outstanding engineering features are: lower weight per horsepower; reduced fuel consumption per brake horsepower; greater thermal efficiency; higher rotative speed without excessive piston speed.

The new Sterling Viking Diesels—six or eight cylinder, supercharged and unsupercharged—as well as the complete line of Sterling gasoline and gas engines are fully described in these new booklets, "Dependable Power" and "Marine Power". Everyone interested in selecting a new power plant for marine or industrial use will want a copy. Write for yours without obligation.

STERLING ENGINE COMPANY
1266 NIAGARA STREET BUFFALO 13, NEW YORK
New York City, 900 Chrysler Bldg. • Washington, D. C., 806 Evans Bldg. • Chicago, Ill., 855 Board of Trade Bldg.
DISTRIBUTORS IN PRINCIPAL CITIES

STERLING ENGINES...MARINE AND STATIONARY...FROM 68 TO 1800 HORSEPOWER...GASOLINE, GAS AND DIESEL FUELS...ARE AVAILABLE NOW



KEEP YOUR ENGINE SAFE

...with a PENN SAFETY CONTROL

• Sure, little engine troubles may seem unimportant in themselves. But let them get away undetected—and they may grow up into major breakdowns, involving the loss of precious time and money. That's why it's important to find them right away and correct them before they cause serious damage.

A PENN Safety Control on your engine gives you effective, low-cost protection against such minor troubles developing into major breakdowns. For, whenever the jacket water temperature rises too high or oil pressure fails . . . this protective device goes into action . . . sounding an alarm, flashing a warning light or, if desired, shutting down engine operation.

PENN Safety Controls are easily installed on any internal combustion engine . . . obtained on new engines, direct from the manufacturer, or quickly applied to engines now in service. They are built in three basic models: oil pressure only, water temperature only and the combination model. Write today for full information. Ask for Bulletin E-100B. *Penn Electric Switch Co., Goshen, Ind.* Export Division: 13 E. 40th Street, New York 16, N. Y., U.S.A. In Canada: Powerlite Devices, Ltd., Toronto, Ont.

TYPICAL FUNCTIONS OF PENN SAFETY CONTROLS

Diesel Applications. Sounds an alarm only . . . closes magnetic fuel valve and sounds alarm . . . closes magnetic fuel valve only . . . closes magnetic fuel valve and opens pilot relay.

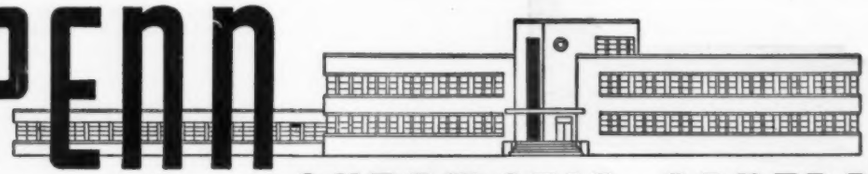
Battery Ignition Applications. Opens battery circuit and sounds an alarm . . . sounds an alarm only . . . opens battery circuit only.

Magneto Ignition Applications. Sounds an alarm only . . . grounds single or dual magneto . . . grounds magneto and sounds an alarm or lights a signal light.

Dual Ignition Applications. Opens battery circuit and grounds magneto.

PENN Combination Pressure and Temperature Control.

PENN



AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, ENGINES, PUMPS AND AIR COMPRESSORS

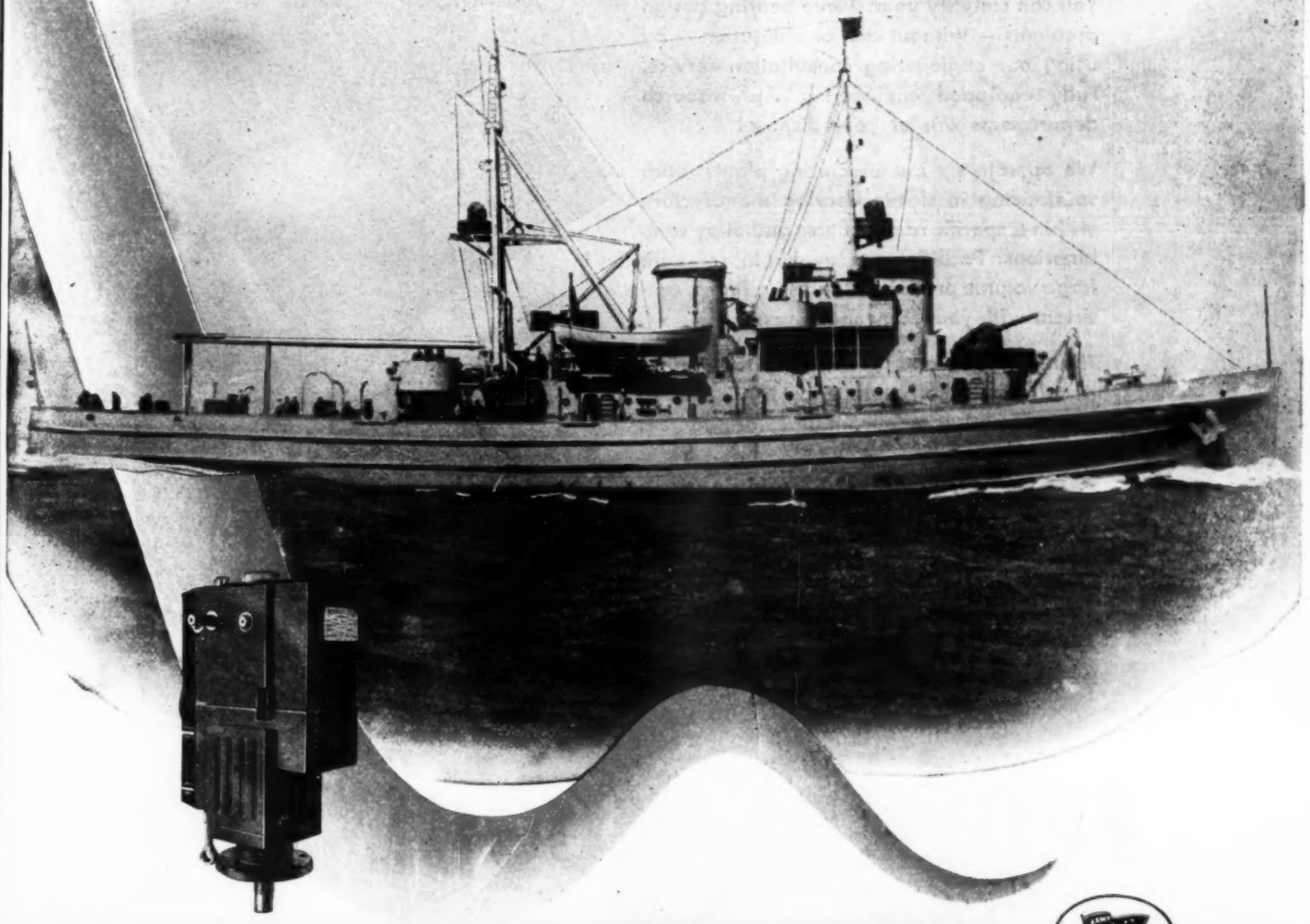
U.S.S. CHOCTAW (AT 70)

Fleet Tug

Diesel Engines Regulated by

Marquette HYDRAULIC GOVERNORS

and OVER-SPEED TRIP GOVERNORS



The Marquette METAL PRODUCTS CO.

CLEVELAND 10, OHIO

Manufacturers of: HYDRAULIC AND ELECTRIC WINDSHIELD WIPERS FOR AIRCRAFT
HYDRAULIC GOVERNORS FOR DIESEL ENGINES • ROLLER BEARING TEXTILE SPINDLES • FUEL OIL PUMPS
AIR COMPRESSORS • PRECISION PARTS AND ASSEMBLIES

ENGINEERING DESIGN SERVICE *for* *Silent* SLEEVE BEARINGS

You can simplify your sleeve bearing design problems — without cost or obligation — by using our engineering consultation service. Fully equipped engineering and research departments are at your disposal.

We operate six manufacturing plants, each specializing in sleeve bearing manufacture within a specific range of size and alloy combinations. Facilities are available for both large volume production and small runs, consistent with your cost requirements.

Thrust washers and precision bronze bearing parts, and large bearings (up to 27" diameter), a specialty. Your inquiries are invited.

FREE: Handbook of Sleeve Bearings

A practical guide for engineers, draftsmen, in bearing design specification. Its use reduces major tooling costs, design and production time. A request on your company letterhead will receive prompt attention.

FEDERAL-MOGUL CORPORATION
11041 Shoemaker, Detroit 13, Michigan

FEDERAL-MOGUL

Silent FEDERAL Mogul **SLEEVE BEARINGS**

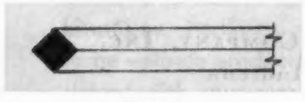
Through the war years, the cost of the job was secondary to *getting that job done.* But from now on, COST—both operating and maintenance—will be the all-important factor in the purchase of new heavy-duty equipment—automotive, industrial or marine. When it comes to deciding what kind of power will operate that equipment at lowest cost, don't overlook the proved-on-the-job advantages of high-speed Cummins Dependable Diesels . . . their demonstrated reliability and long life . . . their easy, economical maintenance and service . . . their high horsepower output per pound of engine weight. Models for all types of heavy-duty power applications—50 to 275 hp.

CUMMINS ENGINE COMPANY, INC.
Columbus, Indiana

CYLINDERHEAD...

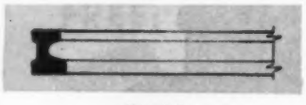
Type O

Type S

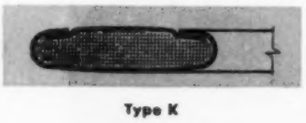


Type T

Special



Special



Type K

To supply modern Diesel Engine requirements, Goetze has developed and supplied a large number of standard and special Cylinder Head Gaskets.

For instance, one group of machines has been turning out special copper marine engine gaskets at maximum production since one year before we entered the war — totalling many millions of gaskets that have done their small part in shaping the World of Tomorrow.

The design of Cylinder Head Gaskets varies widely according to individual requirements — square, round, diamond-shaped, in the standard types, and many special shapes predominate in solid metal gaskets. In addition, metal-jacketed asbestos types are also popular with many manufacturers and engine operators.

What are your requirements — standard or special?
The illustrations above and at left give a partial picture of Goetze's facilities to serve you.

Write stating your problem. Also ask to have your name added to the list of engineers receiving "The Gasket" — a series of technical bulletins containing original gasket data emanating from the Goetze Research Laboratory. Write on your company letterhead giving your position.

GOETZE GASKET & PACKING CO., INC.
32 ALLEN AVENUE, NEW BRUNSWICK, NEW JERSEY

Boston	*New York*	*Philadelphia*	*Pittsburgh*
Cincinnati	*Cleveland*	*Detroit*	*Chicago*
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Goetze for GASKETS

"America's Oldest and Largest Industrial Gasket Manufacturer"

NEED BRONZE PARTS IN A HURRY?

call N·B·M

If lack of proper bronze parts threatens you with costly delays, don't waste time experimenting—*call on N-B-M.*

Maybe you need a single giant rough casting—or 100,000 tiny parts, precision machined—we're ready to fill your most exacting requirements accurately and *quickly.*

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BRONZE PARTS

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NATIONAL BEARING

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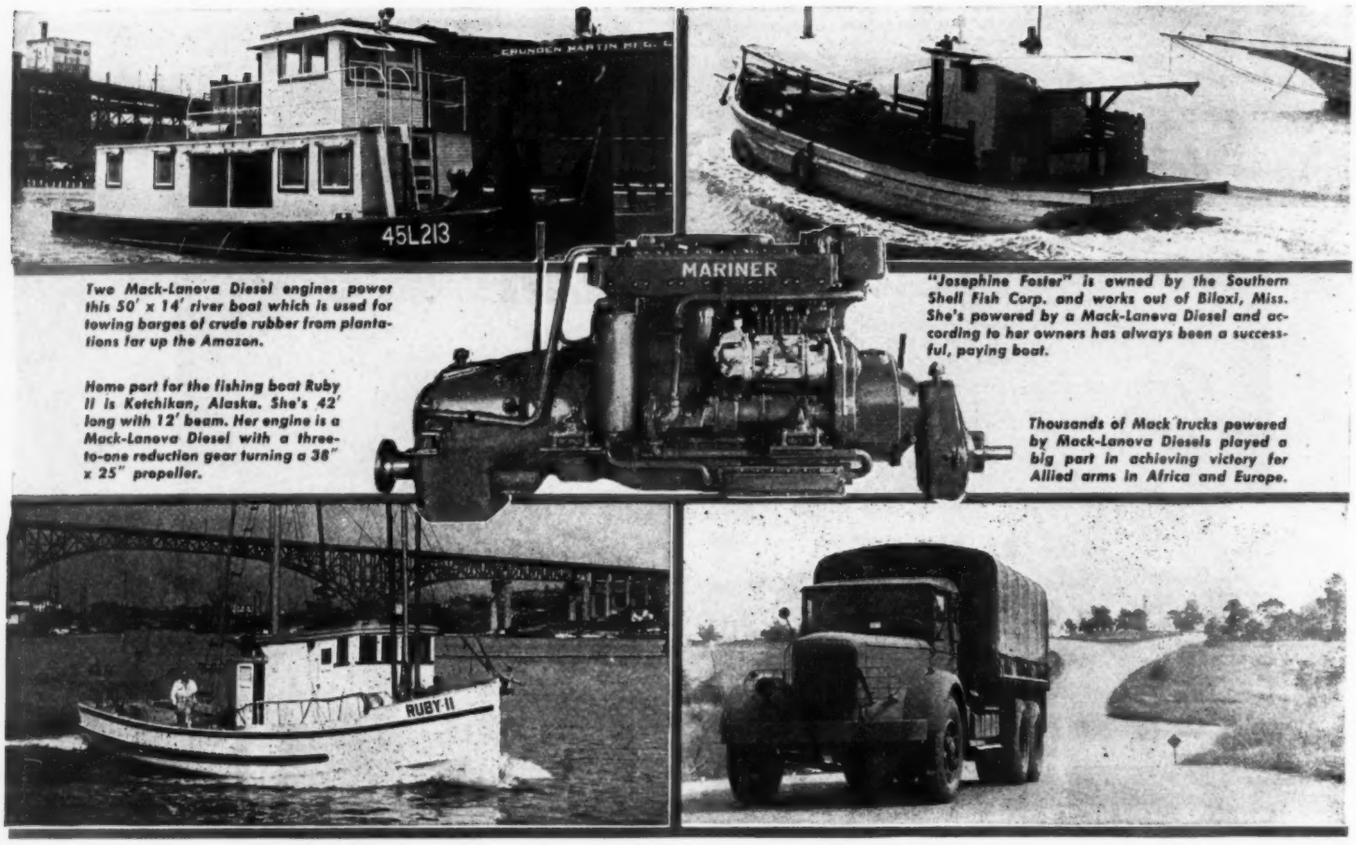
AMERICAN Brake Shoe COMPANY

PLANTS IN: ST. LOUIS, MO. • PITTSBURGH, PA. • MEADVILLE, PA. • JERSEY CITY, N. J. • PORTSMOUTH, VA. • ST. PAUL, MINN. • CHICAGO, ILL.



Two Mack-Lanova Diesel engines power this 50' x 14' river boat which is used for towing barges of crude rubber from plantations far up the Amazon.

Home port for the fishing boat Ruby II is Ketchikan, Alaska. She's 42' long with 12' beam. Her engine is a Mack-Lanova Diesel with a three-to-one reduction gear turning a 38" x 25" propeller.

"Josephine Foster" is owned by the Southern Shell Fish Corp. and works out of Biloxi, Miss. She's powered by a Mack-Lanova Diesel and according to her owners has always been a successful, paying boat.

Thousands of Mack trucks powered by Mack-Lanova Diesels played a big part in achieving victory for Allied arms in Africa and Europe.

Mack-LANOVA *Diesels*

Here is what Mack Manufacturing Company says about Mack-Lanova Mariner Diesels:

"Fair weather and foul — Mack-Lanovas are sturdy and reliable. They are full powered yet compact and economical to run. The range is from 65 to 100 H.P., conservatively rated on a continuous duty basis with quick starting and four cycle dependability."

Lanova Diesels have lower rates of pressure rise and lower peak pressures. *Pressure* rather than explosion does the job. No sledge hammer blows. The comparatively large single nozzle orifice is another distinguishing feature. The results: Low maintenance with high efficiency. Easy starting—complete reliability.

That Lanova has stood up in the crucible of war is evidenced by the increasing number of licensees.

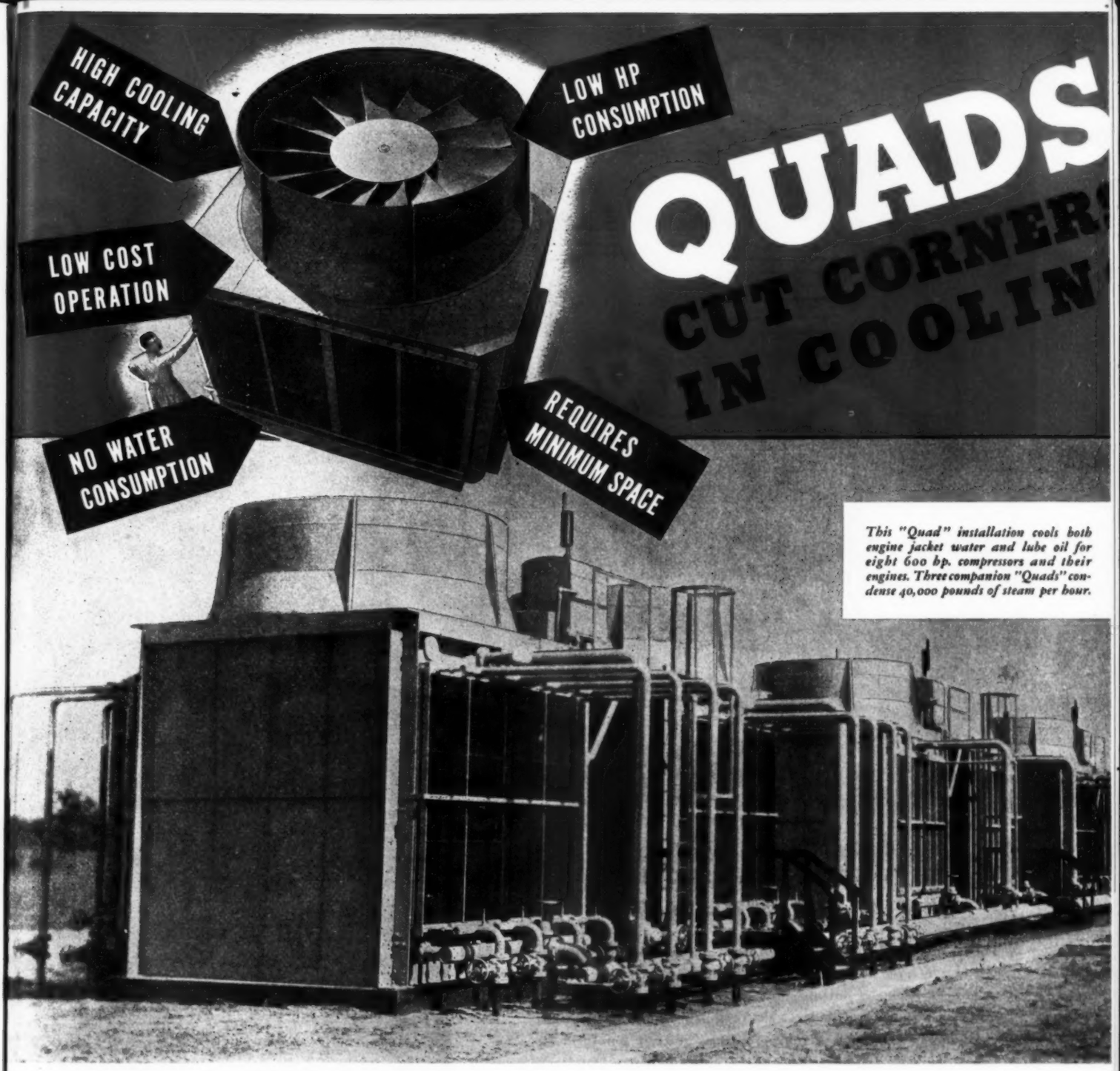
LANOVA
"THE HEART OF THE ENGINE"

LANOVA CORPORATION

27-01 BRIDGE PLAZA, LONG ISLAND CITY 1, N. Y.

LANOVA LICENSEES: ATLAS IMPERIAL · BUDA · CHRYSLER · CONTINENTAL
ELECTRIC BOAT · KOHLER · MACK · U. S. NAVY

I-2



QUADS CUT CORNERS IN COOLIN

This "Quad" installation cools both engine jacket water and lube oil for eight 600 hp. compressors and their engines. Three companion "Quads" condense 40,000 pounds of steam per hour.

In pioneering "Quad" (closed cooling system) radiator type coolers and condensers, Young engineers achieved a higher degree of cooling efficiency with lower operating cost. "Quads" have large capacity and are ideal for installation where cooling requirements are multiple and varied. The vertical exhaust, combined with four sides of cooling, eliminates air re-circulation and the retarding effects of cross-wind currents. All four sides are available for cooling surface. Batteries of Young "Quads" are becoming a familiar sight wherever gas and diesel engines are in use. Let Young engineers supply further data and details without obligation.

YOUNG

HEAT TRANSFER PRODUCTS

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

MANUFACTURERS OF OIL COOLERS • GAS, GASOLINE, DIESEL ENGINE COOLING RADIATORS • HEAT EXCHANGERS • ENGINE JACKET WATER COOLERS • UNIT HEATERS • CONVECTORS • CONDENSERS • EVAPORATORS • AIR CONDITIONING UNITS • HEATING COILS • COOLING COILS • AND A COMPLETE LINE OF AIRCRAFT HEAT TRANSFER EQUIPMENT.

YOUNG RADIATOR COMPANY • **Dept. 235-M** • **RACINE, WISCONSIN, U. S. A.**

Mid-Continent Distributors — *West Coast Distributors*

HELPS SOLVE HEAT PROBLEMS THAT GO WITH SUPERCHARGING

There's more heat to be disposed of when an engine is supercharged —heat generated because, without any increase in engine size or weight, an engine is putting out more power. This heat must be carried off through cylinder walls, cylinder heads and pistons.

Aluminum's superior thermal properties make it a natural for this assignment. Cylinder heads and pistons of Alcoa Aluminum distribute that heat quickly and uniformly, thus preventing destructive temperatures.

Manufacturers' designs of cylinder heads and oil-cooled pistons, developed with the assistance of Alcoa engineers, assure maximum efficiency and safety in the operation of supercharged engines. The benefits gained by this experience are yours for the asking. Write ALUMINUM COMPANY OF AMERICA, 2141 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

Peace and rest at length have come

All the day's long toil is past

And each heart is whispering "Home,

Home at last"

THOMAS HOOD

SUPERIOR ENGINES

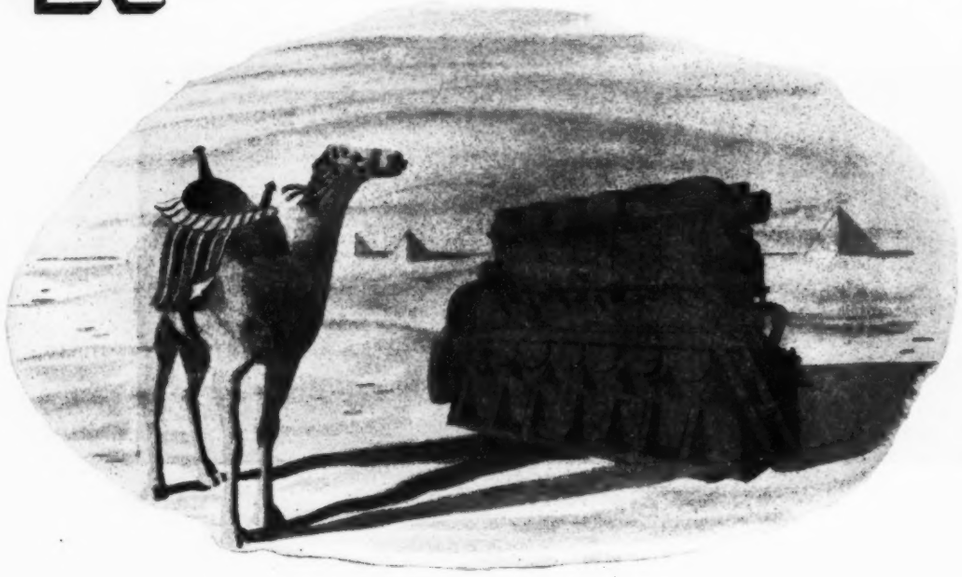
Division of

THE NATIONAL SUPPLY CO.

Plant and General Sales Office:

Springfield, Ohio

Nature protects the camel



. . . but *not* your Deisels

A Sahara dust storm is far less harmful to a camel than the everyday "dust storms" that attack your power equipment. Yes, nature has its way of protecting the camel — but your diesels and other precious engines or compressors must be equipped with air cleaners to prevent costly time-consuming breakdowns which result from excessive wear caused by abrasive dust and grit that gets into their vitals. Across the nation, Cycoil cleaners are prolonging the life of valuable power equipment at costs insignificant when compared to savings in wear, running time and man hours. Send for Bulletin No. 130-D.

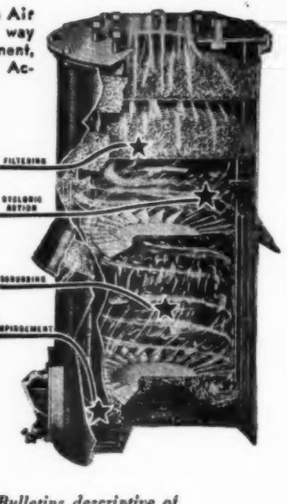
Cycoil Oil Bath Air Cleaner provides 4 way cleaning — Impingement, Scrubbing, Cyclonic Action and Filtering.

Filtration thru Double Cells completes cleaning action eliminating oil mist from air. 4 FILTERING

Cyclonic action induced by vanes throws oil containing dust outward. 3 CYCLONIC ACTION

Scrubbing action thoroughly mixes air and oil, entraining all dust particles. 2 SCRUBBING

Impingement of dirty air against oil, deposits the heavier dust particles immediately. Oil and air mixture then passes upward with whirling motion thru vanes to succeeding cleaning steps. Cycoil bulletin No. 130 D gives complete information. 1 IMPINGEMENT



A complete line of Engine and Compressor filters have been developed by AAF engineers. Bulletins descriptive of each type from unit to large automatic, self-cleaning filters for multiple unit service are available without obligation.

AMERICAN AIR FILTER COMPANY, INC.
Incorporated
408 Central Avenue — Louisville 8, Kentucky
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AAF

CYCOIL AIR FILTERS

If you're looking for a way TO CUT PRODUCTION COSTS

Design that part in ArmaSteel

Manufacturers in scores of industries have stepped up output per man-hour—lowered product cost with no sacrifice of product performance—by specifying ArmaSteel for the production of vital parts.

Cast to conform closely to finished shapes, and providing exceptional machinability, ArmaSteel reduces machining requirements at the same time it speeds machining operations. In many cases, parts production has been increased as much as 70%—with a substantial saving in tool wear and cost per piece.

Ready response to localized hardening, together with a wide range of physical properties that can be supplied accurately and consistently, makes ArmaSteel a metal of great adaptability. Let us show you how ArmaSteel can meet your requirements—and how to take advantage of the savings it offers.

They finished their job—let's finish ours . . . BUY VICTORY BONDS

ArmaSteel*

CAST FOR A LEADING ROLE IN INDUSTRY

SAGINAW MALLEABLE IRON DIVISION OF **GENERAL MOTORS**

SAGINAW, MICHIGAN

*Reg. U. S. Pat. Off.

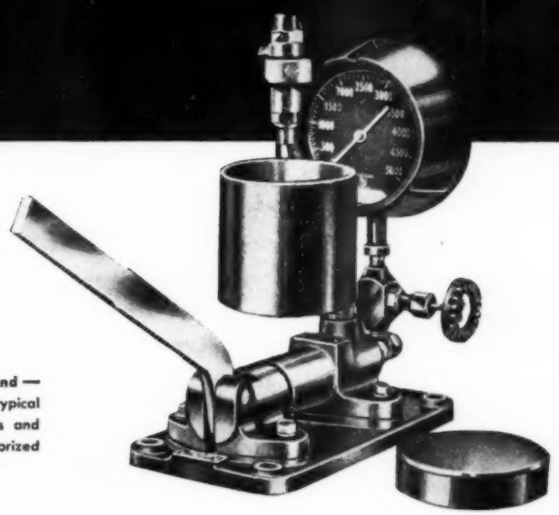
In peace as in war, American Bosch continues to supply the Nation's Diesel builders and users with precision fuel injection equipment and with competent world-wide maintenance facilities.

They're passing their "run-in" test to prove their ability to deliver uniform charges of fuel to each Diesel cylinder. Then they will be ready for final calibration and the word "go."

That is another of many examples of the care which attends every step of American Bosch Precision Production for Power.

Such teamwork of specialized engineering experience and traditional craftsmanship continues to draw most of the Nation's Diesel builders to Springfield for the fuel injection equipment to meet their specific needs.

AMERICAN BOSCH CORPORATION • Springfield 7, Massachusetts



American Bosch Nozzle Test Stand — accurate, thorough, dependable — typical of the factory-designed service tools and test equipment in use at the authorized stations below.

AT THESE AUTHORIZED AMERICAN BOSCH STATIONS

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Birmingham 3, Birmingham Electric Battery Co., Ave. B & 23rd St. S.

ARIZONA
Phoenix, Charlie C. Jones Battery & Elec. Co., 318-322 W. Jefferson St.

CALIFORNIA
Fresno, Winther Bros., 612 Divisadero St.
Los Angeles 21, Magneto Sales & Service Co., Inc., 751 Towne Ave.
Sacramento 6, Langner & Rifkin, 1116-22 15th St.
San Francisco 3, Furrer & Uster, Inc., 225 Seventh St.

COLORADO
Denver 3, Central Supply Company, 1171 Lincoln St.

DISTRICT OF COLUMBIA
Washington Diesel & Ignition Service, Inc., 925 Girard St., N. E.

FLORIDA
Jacksonville 1, Spencer Electric, Inc., 40 W. Beaver St.
Miami, Dade Drydock Corp., 777 Biscayne Blvd.
Miami 36, Florida Diesel Service Co., 1930 N. Miami Ave.
West Palm Beach, Sutcliffe's Electric Co., 222 North Olive Ave.

GEORGIA
Atlanta 3, Auto Electric & Magneto Co., 477 Spring St., N.W.

IDAHO
Lewiston, Osterman Diesel & Electric Co., 0114-9th St.

ILLINOIS
Chicago 16, Illinois Auto Electric Co., 2101 Indiana Ave.

INDIANA
Indianapolis 4, Gulling Auto Electric Co., 450 N. Capitol Ave.

IOWA
Des Moines 9, Electrical Service & Sales Co., 1313 Walnut St.

KANSAS
Wichita 2, E. S. Cowie Electric Co., 230 S. Topeka Ave.

KENTUCKY
Louisville 2, Kentucky Ignition Co., Inc., 737 S. 3rd St.

LOUISIANA
New Orleans 13, John M. Walton, 1009 St. Charles Ave.

MAINE
Portland 5, Portland Tractor Co., Inc., 803 Forest Ave.

MARYLAND
Baltimore, Stephen Seth & Co., Inc., 876 Park Ave.

MASSACHUSETTS
Boston 15, W. J. Connell Company, 121 Brookline Ave,
Boston 10, Wharf Machine & Electric Co., Inc., 265 Northern Ave.

MICHIGAN
Detroit, Knorr-Maynard, Inc., 5743 N. Woodward Ave.

MINNESOTA
Minneapolis 2, Reinhard Bros. Co., Inc., 11 South 9th St.

MISSOURI
Kansas City 8, Electrical & Magneto Service Co., 2538 Grand Ave.
St. Louis 3, Motor Electric Service Co., 2900 Washington Blvd.

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Newark 2, Tire Trading Company, Inc. 239 Halsey St.

NEW YORK
Brooklyn 9, E. A. Wildermuth, 1102 Atlantic Ave.
Buffalo 8, Hettrich Electric Service, 1032 Ellicott St.
New York 23, The Durham Co., Inc., 17 West 60th St.

OHIO
Cleveland 14, The Cleveland Ignition Co., 1301 Superior Ave., N. E.

OKLAHOMA
Oklahoma City 2, American Electric Ignition Co., 725 N. Broadway
Tulsa, Magneto Ignition Company, 701 West 5th St.

OREGON
Portland 14, Automotive Products, Inc., 1511 Southeast Grand Ave.

PENNSYLVANIA
Camp Hill, L. B. Smith, Inc.
Philadelphia, Auto Gear & Parts Co., 1410 West Hunting Park Ave.
Pittsburgh 13, Automotive Ignition Co., Inc., 4917-4919 Baum Blvd.

TENNESSEE
Knoxville 7, R. T. Clapp Company, 401-7 N. Broadway
Memphis 4, Automotive Elec. Service Co., 982 Linden Ave.

TEXAS
Dallas 1, Beard & Stone Electric Co., Inc., 2101 Bryan St.
Houston 1, Beard & Stone Electric Co., Inc., 805 Polk Ave., P. O. Box 1717
Odessa, Verner Electric Company 1502 West 2nd St.

UTAH
Salt Lake City 2, Koepsel & Love, 47 East 7th South St.

VIRGINIA
Richmond, Charles H. Woodward Electric Co., 709 West Broad St.

WASHINGTON
Seattle 14, Sunset Electric Company, 300 Westlake North, P.O. Box 3148
Spokane 8, Sunset Electric Company, 1st & Adams Sts.

WISCONSIN
Milwaukee 2, Wisconsin Magneto Company, 918 N. Broadway

CANADA
Calgary, Hutton's, 131 11th Ave., W.
Edmonton, Smith Battery & Auto Electric, 10125 105th St.
Montreal, International Electric Co., Ltd., 1037 Bleury St.
Regina, The Electric Motor Service, 1734 Broad St.
Toronto, A. Cross & Co., Ltd., 45 Elm St.
Toronto, Auto Electric Service Co., Ltd., 1009 Bay St.
Vancouver, Jeffre & Jeffre, Ltd., 775 Homer St.
Vancouver, Macfarlane & Co., 1257 Seymour St.
Vancouver, Vivian Engine Works, Ltd., 1090 W. 6th Ave.
Winnipeg, Brown & Murray, Ltd., 237-241 Fort St.

HAWAIIAN ISLANDS
Honolulu, Honolulu Iron Works

PANAMA
Panama, Wallingford & Arango Inc., Calle 17, Oeste #77

PUERTO RICO
San Juan, General Farm Equipment Co., Tras-Miramar, Santurce

LIST OF AUTHORIZED FOREIGN SERVICE AGENCIES ON REQUEST

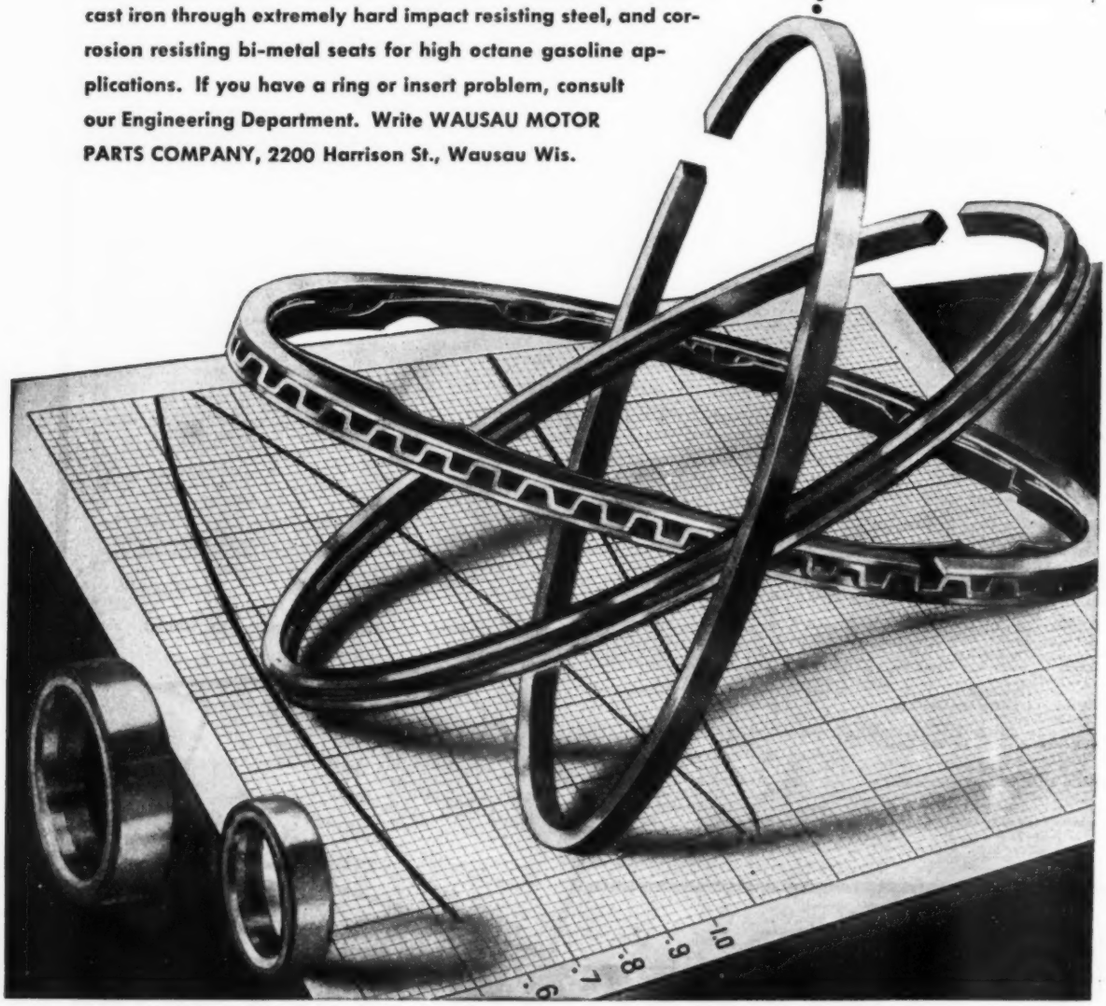
Factory Trained Mechanics
Most Modern and Up-to-Date Methods
Factory Designed Service Tools and Test Equipment

AMERICAN BOSCH

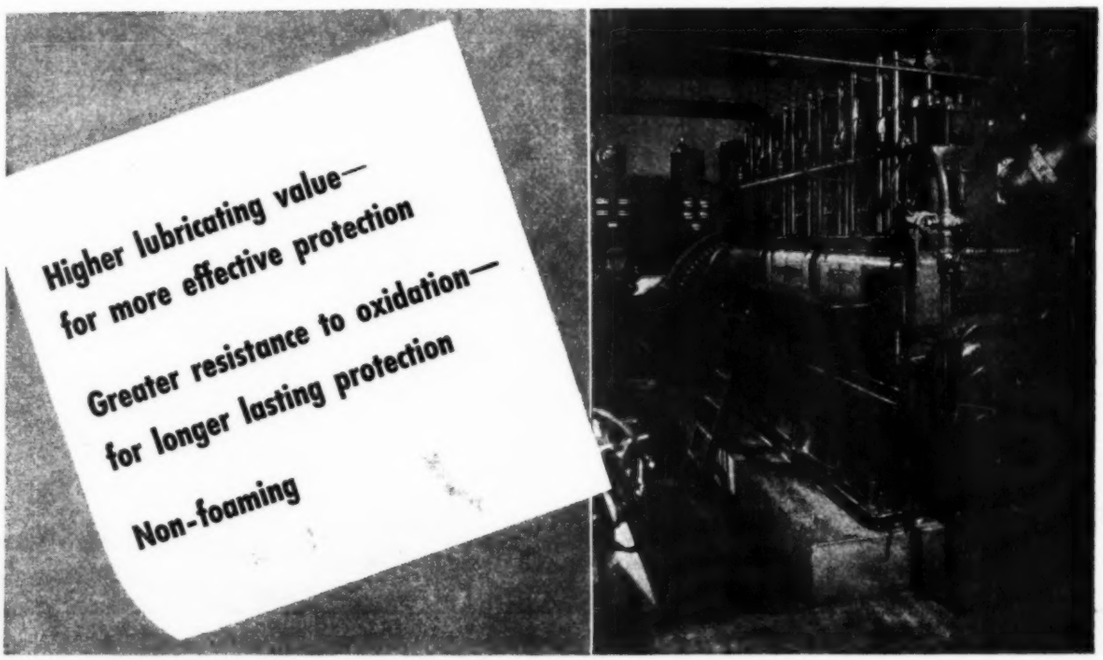
DIESEL FUEL INJECTION EQUIPMENT • SPRINGFIELD, MASS.

Ringtronics by **WAUSAU**

● Piston ring design, metallurgy and precision manufacture directly affect power output, fuel economy and maintenance costs. Each advancement in engine design requires that piston rings be *engineered* to meet new performance standards ● The broadening use of Wausau rings by manufacturers of Diesel, gasoline and gas engines testify to the progressiveness of Wausau in keeping abreast of accelerated wartime development ● With *valve seat inserts* as with piston rings, Wausau has achieved important advances...in inserts of specially alloyed cast iron through extremely hard impact resisting steel, and corrosion resisting bi-metal seats for high octane gasoline applications. If you have a ring or insert problem, consult our Engineering Department. Write WAUSAU MOTOR PARTS COMPANY, 2200 Harrison St., Wausau Wis.



Every feature of the improved **GULF PARVIS OIL** points to better lubrication of your Diesels!



"The 5-year maintenance record of this Diesel with Gulf Parvis Oil in service is hard to beat," says the Chief Engineer of a prominent paper mill. "No repairs have been necessary during this period, and cylinder wear totals only .005 inches."

THE UNIT PICTURED here is one of many industrial and marine Diesels that have operated with greater efficiency and economy over a period of years with Gulf Parvis Oil in service.

Now modern petroleum technology has made possible a further improvement in Gulf Parvis Oil! Read above the important advantages of this improved oil—every one points to better lubrication of your Diesels!

GULF INDUSTRIAL LUBRICATION

Call in a Gulf Service Engineer today and ask him to recommend the proper grade of Gulf Parvis Oil to fit your particular requirements. Write, wire, or phone your nearest Gulf office.

Gulf Oil Corporation · Gulf Refining Company

Division Sales Offices:

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Gulf Oil Corporation · Gulf Refining Company
3800 Gulf Building, Pittsburgh 30, Pa.

Please send me, without obligation, complete information on the new improved Gulf Parvis Oil.

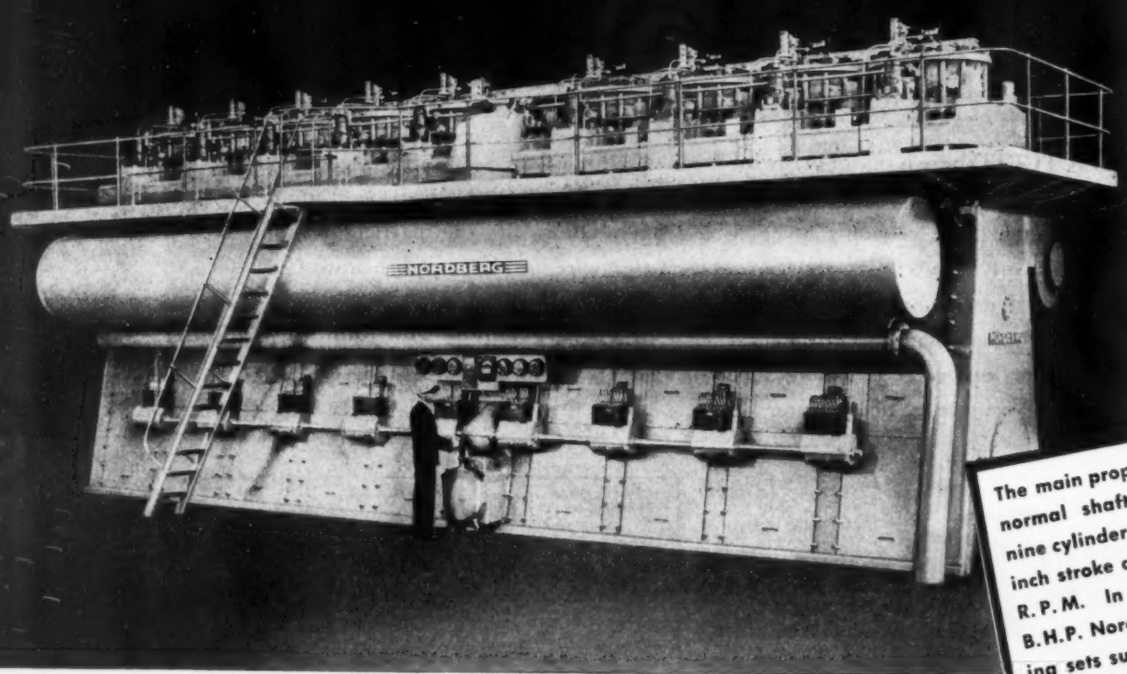
Name.....

Company.....

Title.....

Address.....

NORDBERG *Again*

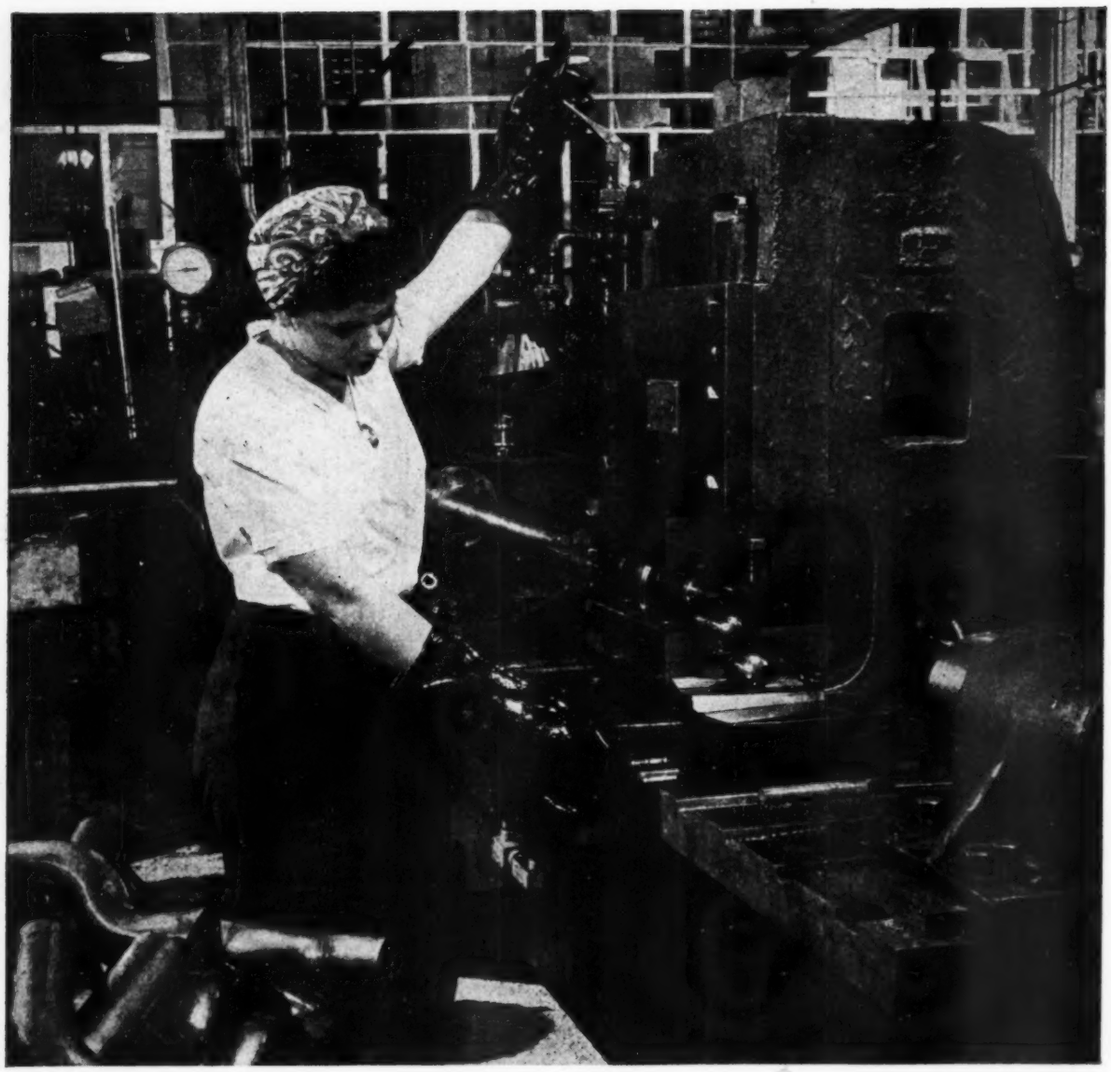


The main propulsion unit of 6000 normal shaft horsepower with nine cylinders of 29 inch bore, 40 inch stroke and operating at 160 R. P. M. In addition, two 1250 B. H. P. Nordberg Diesel generating sets supply auxiliary power.

MAKES DIESEL HISTO

THE successful completion of the sea trials of the Motorship EMORY VICTORY was a noteworthy event in Diesel engine ship propulsion. This Victory ship constructed under the Maritime Commission's ship-building program is propelled by the most powerful, single acting Diesel engine so far built in this country. It takes its place in American shipping with 244 other fast, dependable cargo ships, tankers and naval supply vessels propelled with Nordberg Diesels. When considering propulsion machinery, investigate the merits of Nordberg Diesel power.

NORDBERG MFG. COMPANY • MILWAUKEE 7, WISCONSIN



"Balling out" a tube is a Precision Operation

Our business is bending tubes. It's an exacting, intricate job. Some tube bends must be made so accurate that "balling out" is necessary.

This is an important process of precision where a tube is placed in a die and steel balls of uniform diameter are forced through every bend so that every part of the curved and straight sections is standard and each tube is a counter part of every other tube in the same lot.

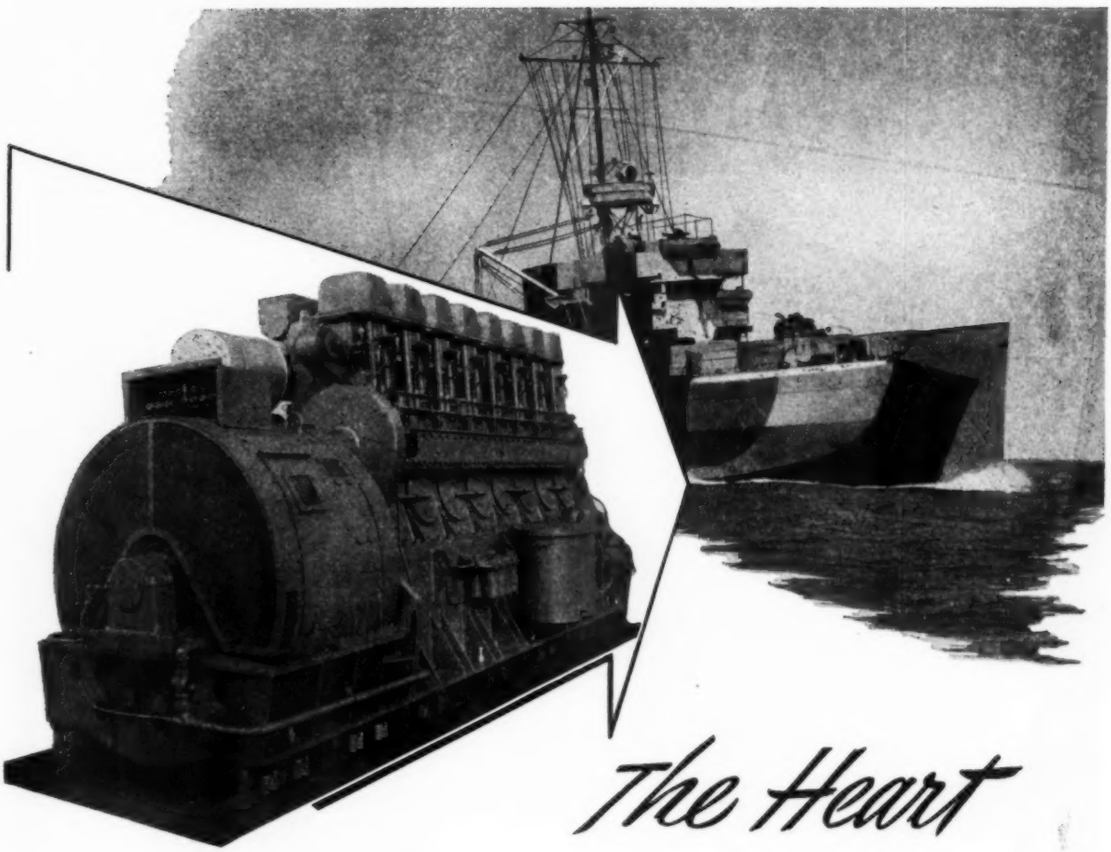
This is a typical example of the unusual care that characterizes every step in the bending of every tube at the American Tube Bending Company, Inc.—from the tiniest of oil lines to a five-inch exhaust manifold.

If you have a tube bending job that calls for this kind of care, entrust it to us. We have had a proud record for reliability and stability—for the past 35 years.

Write for informative booklet "Precision in Tube Bending" to the American Tube Bending Company, Inc., 5 E. Lawrence Street, New Haven 11, Conn.

AMERICAN TUBE BENDING COMPANY, INC.

PRECISION to aircraft standards



The Heart

OF A MINE SWEEPER

Although the final victory is won, these sturdy mine sweepers are still hard at work clearing the seas for peacetime shipping. Now, as in the midst of battle, the power plant must not fail. BALDWIN DIESEL ENGINES WILL CONTINUE TO GIVE DEPENDABLE SERVICE UNDER ALL CONDITIONS. The Baldwin Locomotive Works, Philadelphia 42, Pa., U.S.A. Offices: Philadelphia, New York, Chicago, Washington, Boston, Cleveland, St. Louis, San Francisco, Houston, Pittsburgh, Detroit.

BALDWIN PRODUCTS Hydraulic presses, Testing equipment, Steel forgings and castings, Diesel-electric locomotives, Diesel engines, Metal plate fabrication, Rolled steel rings, Bronze castings, Heavy machine work, Crane wheels, Bending rolls, Plate planers, Babbitt metal, Alloy iron castings, Briquetting presses.

BALDWIN
DIESEL ENGINES

SERVICE REPORT

THE PARKER APPLIANCE COMPANY

This is the present status of the case in which a Parker Triple Fitting replaced a wrought iron elbow, which was braised to the static pressure lead in a gas meter.

Under pressure surges -- from 5 pounds to 4,000 pounds -- the wrought elbows frequently exploded, destroying the meter dial and spraying out broken metal and shattered glass.

Meter readers feared to go near these meters, service costs were high and the company was losing business.

When Parker 1/8" triple fittings replaced the wrought iron elbow, results were:

1. Reduced installation time.
2. Safe handling of all pressures involved.
3. No injured hands for workmen (installation was in a hard-to-reach corner).
4. Flared type fitting easily serviced, if necessary, by customer's maintenance men.

Company then made same replacement on equipment in service -- all trouble eliminated.

Association promoting industrial gas meters reported that Parker triple type fitting has proper flare angle to withstand high pressures, and provided tight connection without injury to tubing.

The patented Parker Triple Coupling—easy to install and service—proof against leakage and vibration.

The principle of this coupling is the basis for modern Fluid Power Systems.

The record of Parker couplings, valves and fabricated tubing is one of complete dependability in both war and peace.

Whatever you make, or plan to make, consult a Parker Fluid Power engineer on tubing systems for either fluid or power transmission. The Parker Appliance Company, 17325 Euclid Ave., Cleveland 12, Ohio.

THE PARKER APPLIANCE CO.

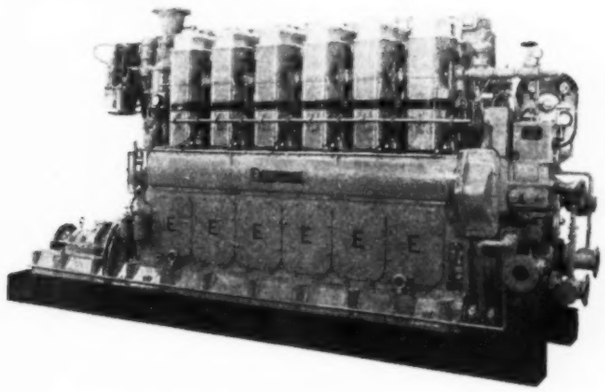
CLEVELAND • LOS ANGELES

FLUID POWER PRODUCTS FOR ALL INDUSTRY

powered by

ENTERPRISE

"Boaz", 70' by 15' 5" by 7'; owner, C. G. Leverette Towing Co., New Orleans. Power, DMG 36 Turbo-Charged Enterprise, 600 hp at 400 rpm.



Tugboat operators in the Gulf area are proving that the surest means to develop the maximum pulling ability of their hulls is to power them with the Turbo-charged Enterprise Diesel.

Turbo-charging by Enterprise means up to fifty per cent more horsepower at the same rpm, meaning more towing power and more profit for YOU.

The above Enterprise Turbo-Charged Diesel, model DMG 36, 600 hp at 400 rpm, may be exactly the model required for repowering your present hulls or driving your prospective boats. Other models are available, from 200 to 1800 hp. Contact the nearest Enterprise branch Today!

ENTERPRISE
ENGINE AND FOUNDRY CO.

18TH & FLORIDA STREETS SAN FRANCISCO, CAL.
BOSTON NEW YORK WASHINGTON CHICAGO SEATTLE
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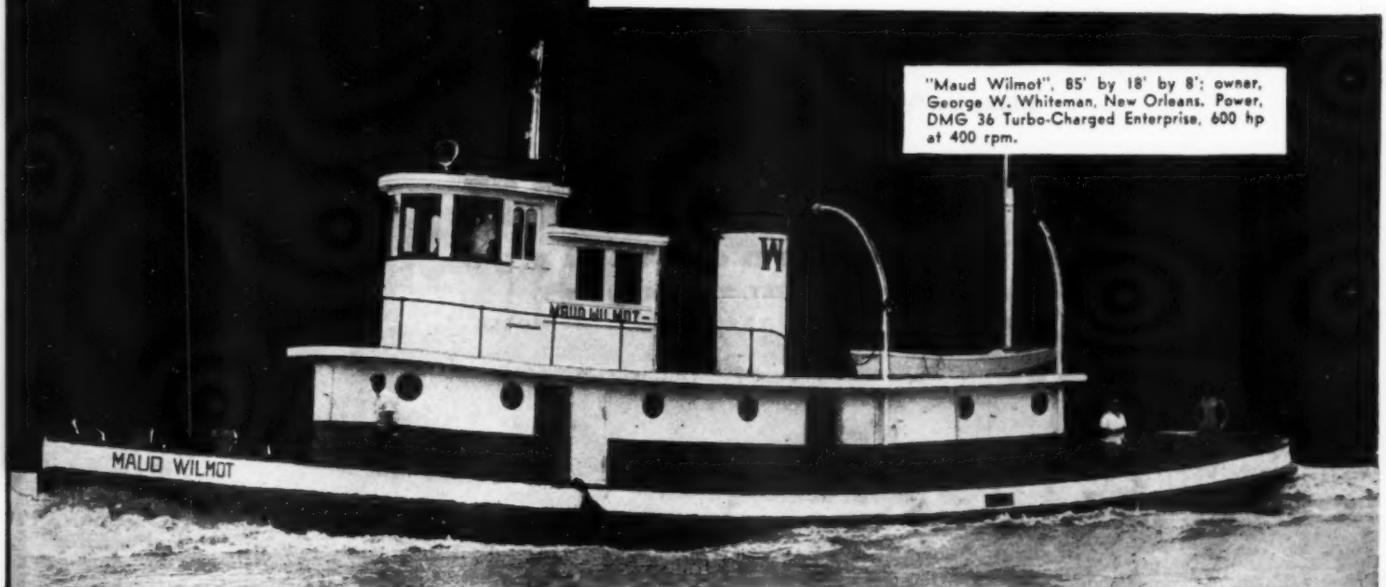
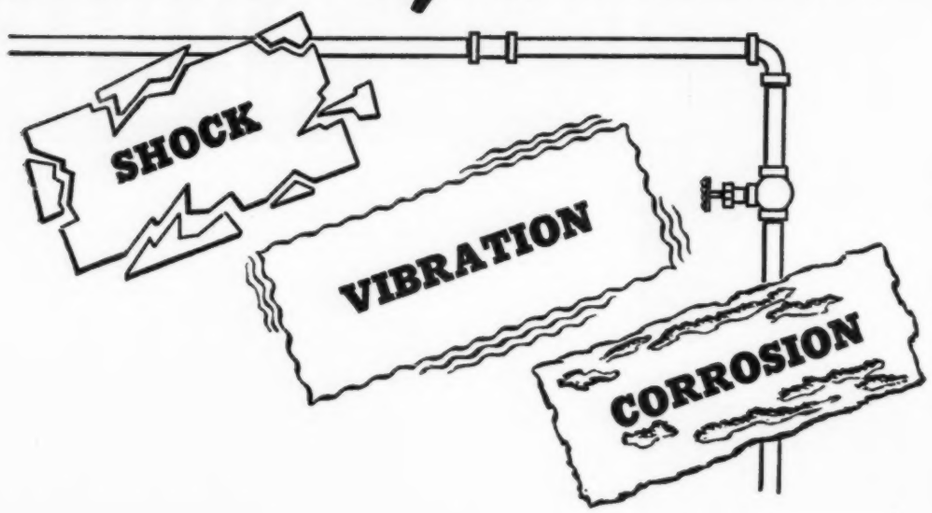
NEW ORLEANS—POYDRAS & BARONNE STS. PHONE MA 6755-6756

"Maud Wilmot", 85' by 18' by 8'; owner, George W. Whiteman, New Orleans. Power, DMG 36 Turbo-Charged Enterprise, 600 hp at 400 rpm.



End the Triple Menace TO COPPER TUBE AND BRASS PIPE LINES



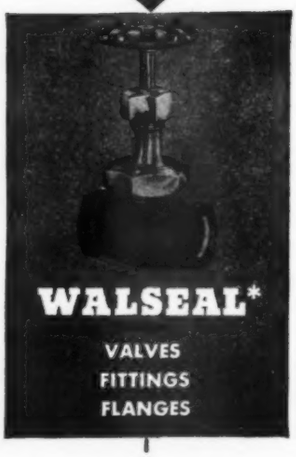
with THREADLESS SILBRAZ* JOINTS

Shock! Vibration! Corrosion! Yes, a Silbraz Joint made with Walseal* valves, fittings and flanges "has what it takes" to overcome this triple threat to copper tube (iron pipe size) and brass pipe lines—and for keeps.

Why? Because patented Walseal valves, fittings and flanges get their *extra* stamina from a ring of silver brazing alloy built right into each port . . . an alloy that when heated with an oxyacetylene torch flows out between the pipe wall and the fitting, making a joint that is stronger than the tube or pipe itself.

In thousands of installations, these Walseal products have proved beyond dispute that they make a "one piece pipe line" . . . a pipe line that does not creep or pull apart under any shock, vibration or temperature to which the copper tube or brass pipe can be safely subjected.

Write today to Dept. 84 for Catalog 42 giving complete data on Walseal products, as well as on the entire Walworth line.



Make it a "one-piece pipe line" with WALSEAL

12 AWARDS TO 4 PLANTS

WALWORTH

valves and fittings

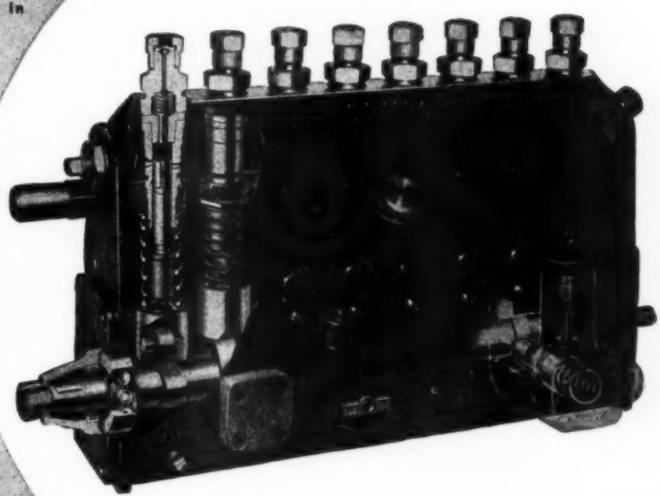
60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

*Patented – Reg. U.S. Patent Office

No Need to Remove a DEMCO "PB" Pump from Engine for Servicing!

- Its pump elements are removable (upwards) without the necessity of removing any other part of the pump.
- New Pump elements slip into the pump housing without any special tool or adjustment in calibration.
- Mounting dimensions are interchangeable with other makes.
- Available with a range of plunger diameters from 5mm. to 13mm., in ½mm. steps.
- "PB" Pumps are built in sizes from 2 to 8 pump units.
- Multi-unit self-contained drive.
- Exceptionally close tolerance manufacture.



Write for complete information

DEMCO

DIESEL ENGINEERING & MANUFACTURING CORP.

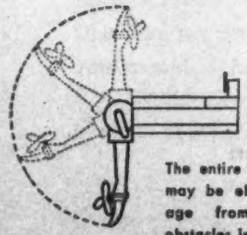
202 NORTH LAFLIN STREET • CHICAGO 7, ILLINOIS

Pacific Representative: PACIFIC DIESEL & ENGINEERING, 29 Pine Street, San Francisco, California

THAT "EXTRA THRUST"

IS THERE WITH THE "HARBORMASTER"

OFFICIAL U.S. NAVY PHOTO



The entire tail assembly may be elevated. Damage from submerged obstacles is prevented by a shear pin which shears off, automatically allowing the outboard drive to move back and upward . . . out of danger.

Proved at work as well as through exhaustive tests, the "Harbormaster" produces *more drive per horsepower* than any conventional propelling and steering equipment! And that's not all! Every model, ranging from 45 H. P. to 330 H. P., guarantees the ultimate in maneuverability with the exclusive, patented M & T 360° Propeller Thrust Steering Control – *steer in any direction* with full power, that *extra* "Harbormaster" power! For dependability, operating and maintenance efficiency the diesel or gasoline powered "Harbormaster" has no equal! Applicable to many phases of the marine industry the post-war models of the "Harbormaster" we are shipping today are "driving forward" all over the world!

MURRAY & TREGURTHA, INC.

High Fidelity Marine Engines since 1885

18 HANCOCK STREET, QUINCY 71, MASS., U. S. A.

MATHEWSON MACHINE WORKS — Manufacturing Affiliate

SHERBROOKE MACHINERIES, LTD., SHERBROOKE, QUEBEC — Licensed Mfr. and Distributor for Canada

MOST VERSATILE LIQUID FILTER EVER DEVELOPED

SUPERIOR to any other filter in flexibility and versatility. Puts you ahead of changes that tomorrow may bring. Provides unusual efficiency and economy. Already field-tested over a broad range of applications.

WIDE VARIETY OF FILTERING MEDIA

Design permits use of media to suit practically every requirement. Any medium—metallic, plastic, or fabric—that comes in sheet form and can be crimped may be used. Tested media include types resistant to both hot and corrosive liquids; also types to remove dirt particles down to 2 microns (.000078") or less in size.

NEW *SLIP-ON* INSERT FOR QUICK CHANGE OF MEDIUM

METHOD OF REMOVING SLIP-ON INSERT

An entirely new idea in the application of filtering medium, the STAYNEW SLIP-ON INSERT, permits quick change or replacement of medium.

LOW FIRST COST, LOW MAINTENANCE COST

Volume production of a basically economical design means low initial cost. Ease of cleaning or replacement of medium mean low maintenance cost.

LARGE FILTERING AREA IN SMALL SPACE

The well-known Staynew Radial Finned Insert Construction provides the largest possible filtering area for available space.

•

Model ELS Filters handle a total of 105,000 gallons per minute in one large industrial plant.

•

REPRESENTATIVES IN PRINCIPAL CITIES

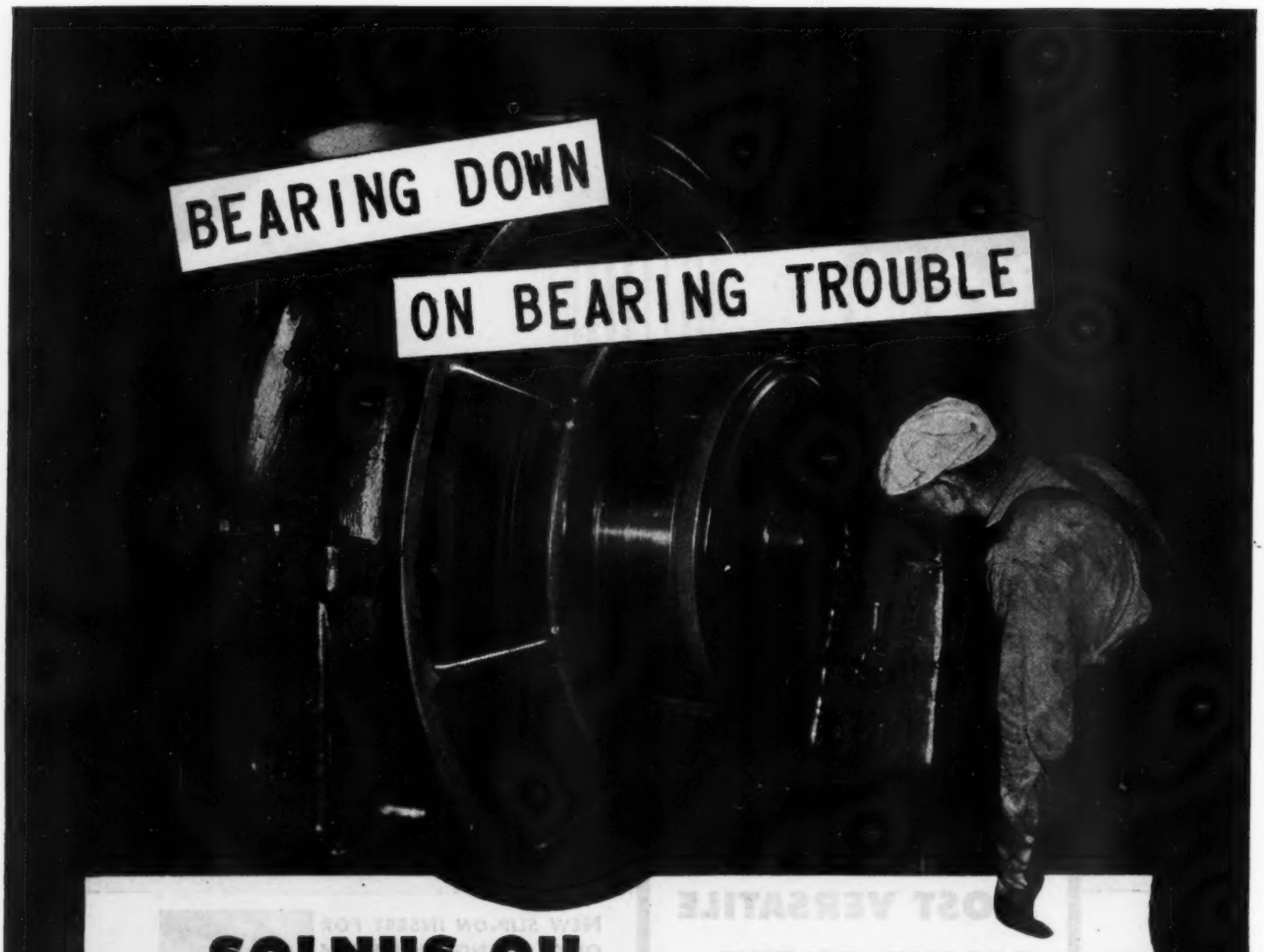
STAYNEW FILTERS

DOLLINGER CORPORATION

(Formerly Staynew Filter Corporation)

Silver Anniversary

12 CENTRE PARK, ROCHESTER 3, N. Y.



SOLNUS OIL . . .

Lowers Bearing-Temperature on Generator, Ends Oil-Throw, Averts Costly Shutdown

While ring-oiled bearings are usually considered a routine matter, here is a case from the Sun industrial files that demonstrates the need for the right oil in the right place — even in simple applications.

An eastern manufacturer called in the local Sun Engineer to study the bearings of the main generator in his power-plant. Bearing-temperatures were high, and the lubricant was being thrown off onto the generator-coils.

Serious injury to the generator — which would have forced a shutdown of the whole plant for an indefinite period — was avoided when they switched to the Solnus Oil recommended by the Sun Engineer.

Bearing-temperatures dropped, and throw-off of oil was reduced to a minimum. The company now uses Solnus Oil for all ring-oiled, electric motors.

In plant after plant, Sun Engineers and Sun lubricants have helped to avoid shutdowns, to increase net production, and to cut maintenance-costs. For all types of power-equipment, Sun manufactures a complete line of quality lubricants . . . for generators; motors; turbines; Diesels; and other types of internal combustion engines. Call the local Sun Engineer near you — or write direct to . . .

SUN OIL COMPANY • *Philadelphia 3; Pa.*

Sponsors of the Seneca News-Voice of the Air — Lowell Thomas

This Brand Name was Awarded the GOLDEN ANNIVERSARY CERTIFICATE by the

SUNOCO

SUN INDUSTRIAL PRODUCTS

OILS FOR AMERICAN INDUSTRY

RUST STEALS MONEY

Stop it!

Those millions of dollars stolen annually by rust's scaly fingers . . . why let them be your dollars? Stop the rust thief in your plant!

Sinclair preventives that helped solve the war's tremendous rust problems are available to end *your* rust troubles. Whether it be protection for

- machinery in regular operation,
- machinery in short-time or extended storage,
- machinery in transit,
- piping, shafting, etc., exposed to corrosion,

there's a Sinclair *war-tested* preventive that *stops* rust . . . extends equipment durability . . . lengthens the life of metal installations.

Sinclair rust preventives are easily applied, easily removed — and they protect both internal and external surfaces.

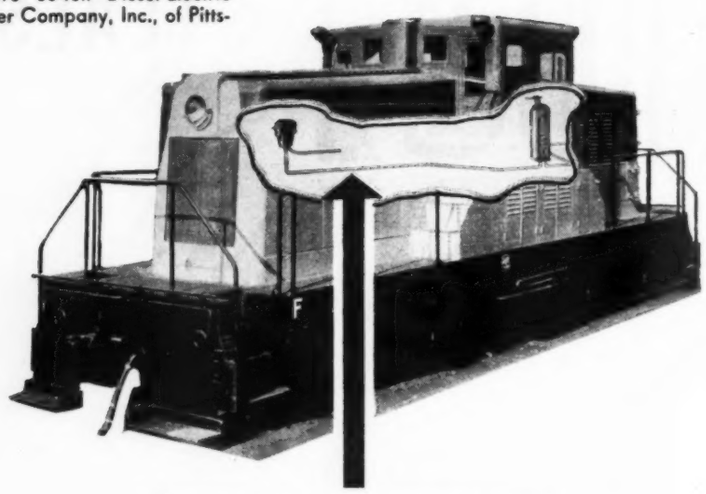
Write us for information about application of Sinclair Opaline* RP Oils, and Sinclair Rust-O-Lene* rust preventives to your problems.

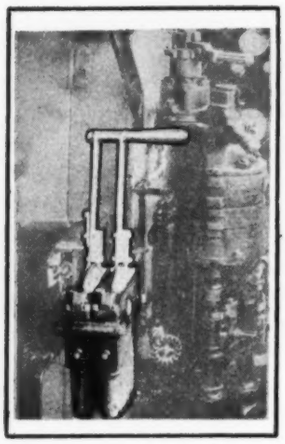
*Reg. U. S. Pat. Off.

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

Below is shown the progressive 80-ton Diesel-Electric Switcher, built by the H. K. Porter Company, Inc., of Pittsburgh, Pennsylvania.





The slightest movement of the throttle is hydraulically transmitted to the motor speed control.

SPERRY'S HYDRAULIC CONTROLS minimize design problems by means of a single connecting tube that can be bent around corners and obstacles or installed through bulkheads, thus reducing design, installation, and maintenance costs.

The H. K. Porter Company, Inc., of Pittsburgh, makers of the well-known Porter Diesel-Electric Switchers, now feature "fingertip control" on their locomotives. This selection adds another application of the Sperry Hydraulic Control; a single-line remote control and positioning device, used successfully by many and varied industries. This is what the H. K. Porter Company has to say about the Sperry Control:

- "The installation assures accurate synchronization of the speed of the two diesel engines in the double power plant.
- It accomplishes this by eliminating the necessity for mechanical linkage from the operator station to the engine by means of flexible piping.
- This method has advantage over previous installations because it does away with troublesome rods, jaws, pins, cables, pulleys, and turnbuckles, and the necessity for mechanical alignment.
- It eliminates lost motion of the mechanical method, back lash, and need for constant adjustment. Just as the installation is easy to design and build, so is it easy to maintain. The control gives instant and accurate response to the slightest movement of the throttle."

EASY INSTALLATION . . . DEPENDABLE . . . ACCURATE

Send for Bulletin 78 for additional details

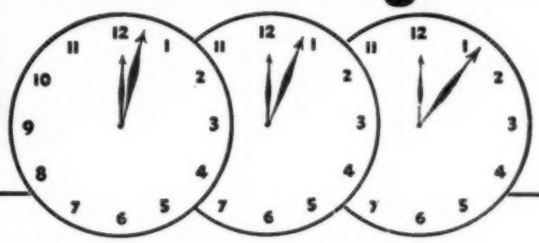
SPERRY

For Scientific Achievement

SPERRY PRODUCTS, INC.

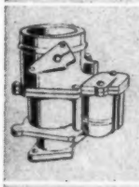
CHICAGO, ILL. HOBOKEN, N. J.

How to Cut Metal Cleaning Time to MINUTES



NEW, FAST-ACTION DETERGENT CLEANS FERROUS AND NON-FERROUS METALS...Easy to Handle

TYPICAL USES FOR Solvent "26"



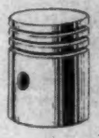
CARBURETORS—Solvent "26" removes gum, gasolene sediment and other accumulations of dirt.

SPARK PLUGS—Solvent "26" safely cleans porcelain; helps loosen carbon deposits.

METAL PLATES AND SCREENS—Solvent "26" restores clear, clean finish to any metal surface.

DIES AND STAMPING—Solvent "26" removes drawing compounds from die-formed or stamped metal.

LABORATORY EQUIPMENT—Solvent "26" frees glass and metal tubing and their supports of gums, varnishes and other incrustations or deposits.



PISTONS—Removes lacquers, gums, resins, etc. from gas, gasolene and diesel engine pistons and rings. Also effective for cleaning all parts of dismantled motors, engines and machinery.

REMOVES:

Oil • Grease • Gums • Varnishes • Lacquers • Paints
Carbonaceous Deposits • Asphaltic Products

FROM:

Steel • Cast Iron • Aluminum • Porcelain • China
Chrome and Nickel Plate • Stone • Precious Metals
Brass • Washable Fabrics

Used throughout the war in critical industry as a superior cleaning agent, newly-developed SOLVENT "26" is now available for all industrial needs.

Offering many advantages in time, labor and cost over other present cleaning methods . . . Solvent "26" is so effective a detergent it can be used at *ordinary* room temperatures.

The fast action of Solvent "26" reduces cleaning time from hours to minutes on dismantled engine parts and all kinds of machinery. Simply dip, rub, brush or spray it on. Then flush clean with hot water.

Mail the coupon today for literature and information leading to a demonstration of this unique product in your own plant.

CITIES SERVICE OIL COMPANY
ARKANSAS FUEL OIL COMPANY

CITIES SERVICE OILS
ONCE-ALWAYS

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Room **529**
70 Pine Street
New York 5, N. Y.

Gentlemen: I am interested in a demonstration of Solvent "26"—at no cost or obligation.

Name.....
Title.....
Company.....
Address.....
City.....State.....

Hard working hand

that keeps on th

How hard a tractor can work, and how long, rests largely with its engine. Drawbar pull is heavy. Strains are great. And the job must go on day in and day out.

It's right here that General Motors Series 71 Diesels shine. Both in peace and at war they have built rare records of performance. Already many of them in tractors have delivered up to 25,000 hours of economical performance and are still going strong.

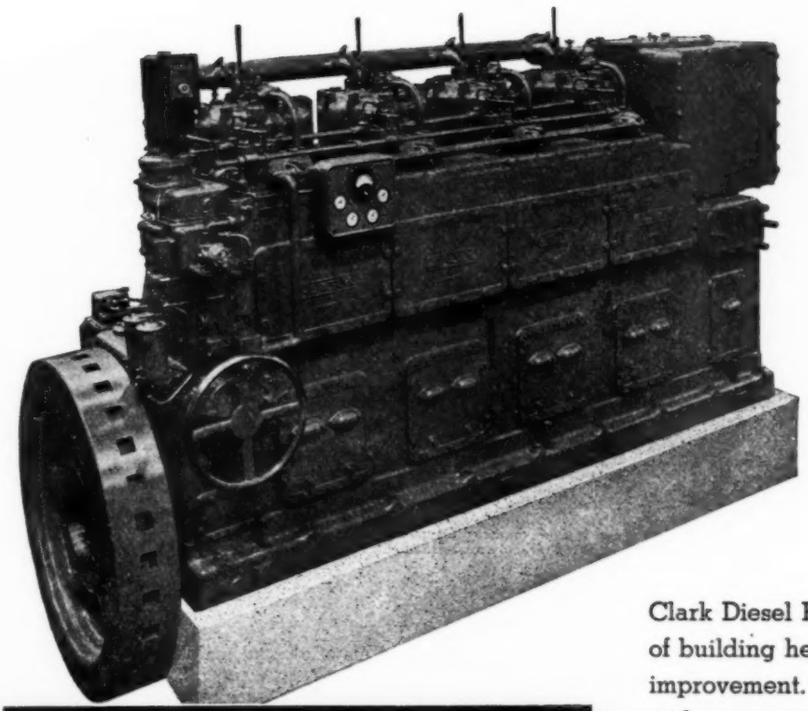
Farmers and construction engineers like them especially because they deliver great power with less than usual size and weight. They start fast and are easy to service. And replacements when needed are readily available because of GM simplified design and because elimination of *different* sizes of parallel parts increases the availability to owners of the right part *when it is needed.*

The successful example of GM Diesel power in tractors indicates its value in other products such as lumber carriers, "special" trucks—in all forms of marine power requirements — in all forms of contractors' and road machinery — in welders—in mining and pumping—in any tough industrial job.

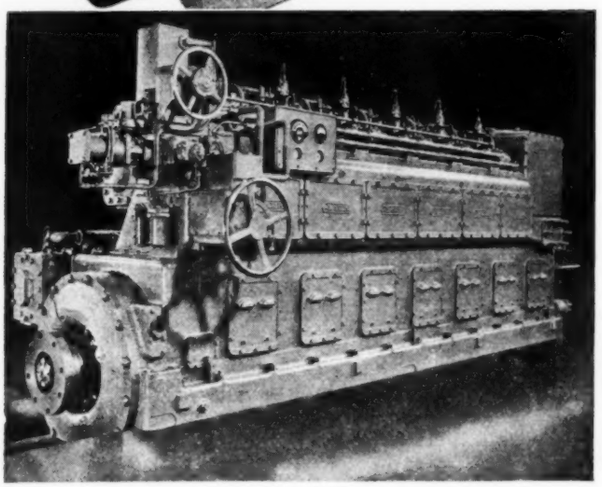
During five years on the Arena-Norton farm, largest vegetable shippers in Arizona, an Allis-Chalmers tractor like this, powered by a GM Diesel, has operated 18,186 hours, day in and day out. This 3,200-acre farm now employs four of these tractors.

KEEP AMERICA STRONG—BUY VICTORY BONDS

FOR HEAVY-DUTY DIESELS SEE CLARK



The Clark "DG" Diesel Engine for general industrial use. A 2-cycle, supercharged unit with oil-cooled pistons, high velocity water cooling and complete pressure lubrication. Sizes 4 to 8 cyl., 500 to 1000 B.H.P.



Clark Diesel Engines today are the result of 25 years of building heavy-duty, 2-cycle engines with constant improvement. They combine maximum ruggedness with extreme simplicity, and can be serviced by relatively unskilled operators. Operating and maintenance costs are low.

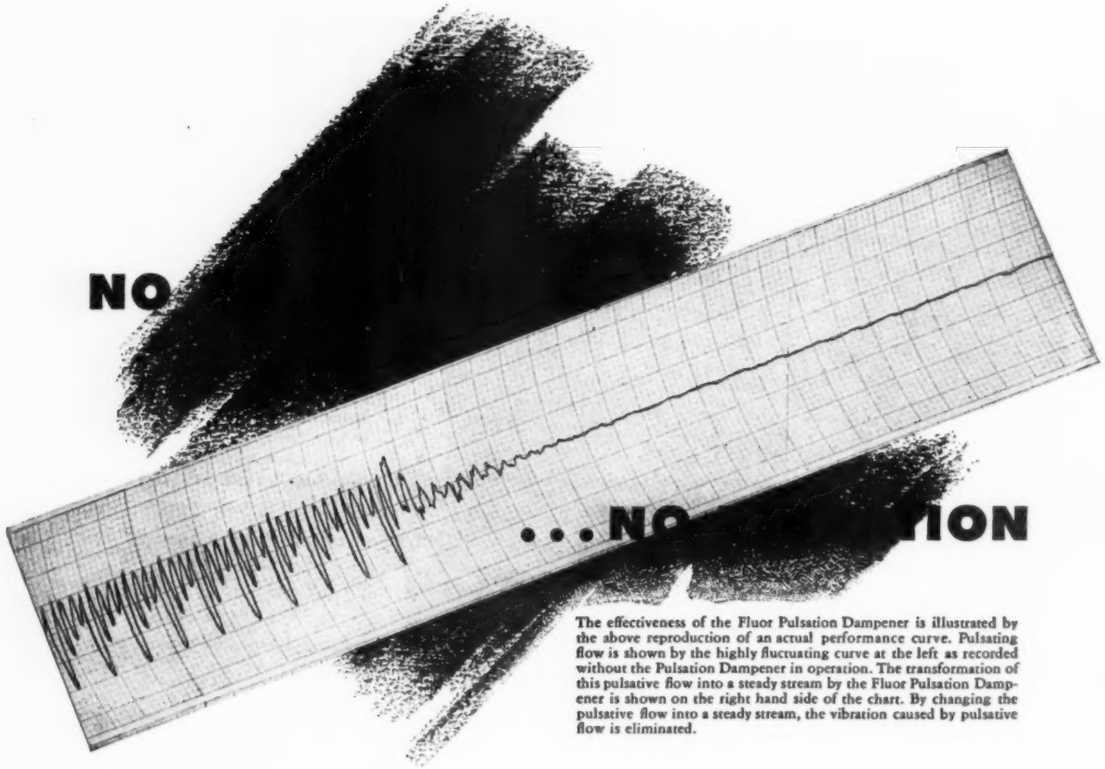
Get the complete story on Clark Engines before you buy your next Diesel.

CLARK BROS. CO., INC, OLEAN, NEW YORK
New York · Chicago · Boston · Houston · Tulsa
Los Angeles · London · Buenos Aires

Clark "MD" Diesel 2-Cycle Marine Engine, single acting, direct reversible, with direct fuel injection; built in Port or Starboard types; 4, 5, 6 and 8 cylinders, 300 to 1000 B.H.P.

CLARK
ONE OF THE DRESSER INDUSTRIES

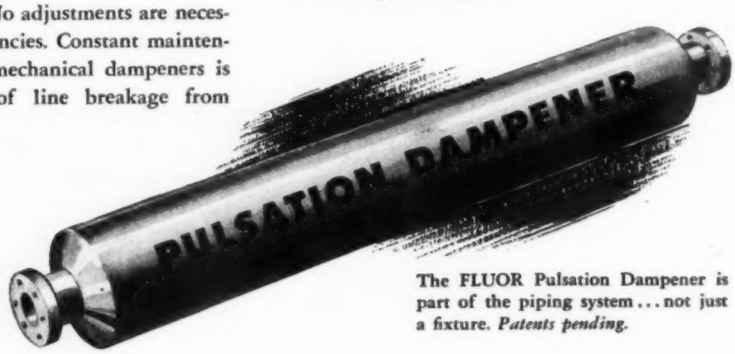
HEAVY-DUTY, 2-CYCLE DIESEL



The effectiveness of the Fluor Pulsation Dampener is illustrated by the above reproduction of an actual performance curve. Pulsating flow is shown by the highly fluctuating curve at the left as recorded without the Pulsation Dampener in operation. The transformation of this pulsative flow into a steady stream by the Fluor Pulsation Dampener is shown on the right hand side of the chart. By changing the pulsative flow into a steady stream, the vibration caused by pulsative flow is eliminated.

THE FLUOR PULSATION DAMPENER smooths pulsative flow into a steady stream in pipe lines carrying air, vapors or gases... regardless of engine speed, pressure or rate of flow. Designed for the *lowest* operating speed, it works even more efficiently as speeds are *increased*. No adjustments are necessary for higher frequencies. Constant maintenance necessary with mechanical dampeners is eliminated. Danger of line breakage from vibration is removed.

You can save on labor, materials and maintenance by specifying the FLUOR Pulsation Dampener on all new installations... and by installing it in your present lines where vibration is a constant problem and expense. Write for descriptive bulletin.



The FLUOR Pulsation Dampener is part of the piping system... not just a fixture. *Patents pending.*

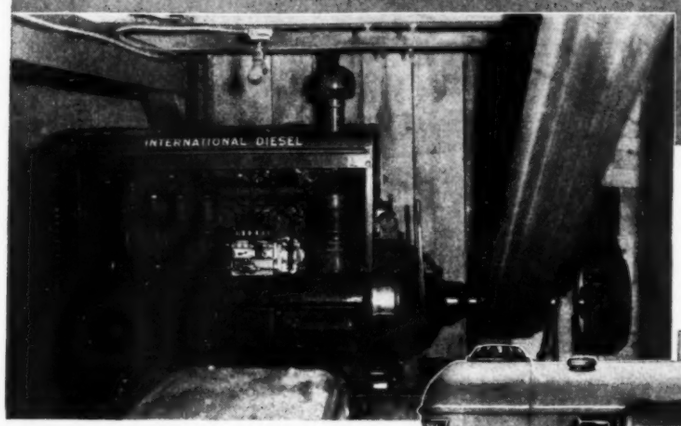
FLUOR

ENGINEERS • MANUFACTURERS • CONSTRUCTORS

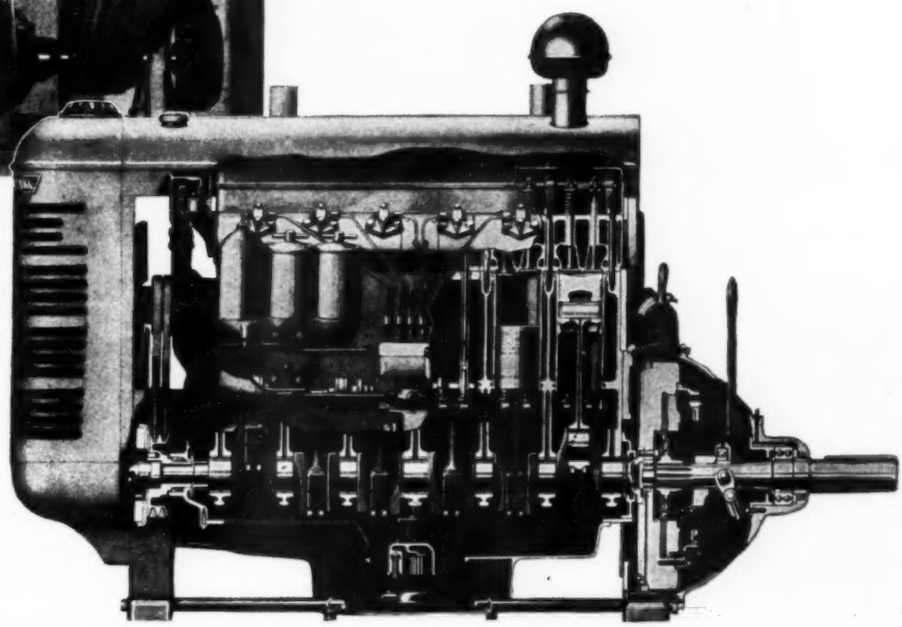
PROCESS PLANTS AND EQUIPMENT FOR THE OIL, GAS AND ALLIED INDUSTRIES

THE FLUOR CORPORATION, LTD., 2500 S. Atlantic Blvd., LOS ANGELES 22 • New York, Pittsburgh, Kansas City, Houston, Tulsa, Boston

DIESEL POWER THAT PAYS *Dividends*



● An International UD-18 Diesel Power Unit, with outboard bearing and two pulleys on extended shaft, is shown "on the job," above. Cutaway illustration at right reveals features of design of this dependable power plant.



INTERNATIONAL Diesel Power always pays out in lower operating overhead—more power for each dollar invested—bigger profits from each unit of work accomplished.

That's the kind of power you want—power that stays with the job and gets it done smoothly, steadily, economically.

Compact power of 4-cycle dependability—flexible power that's adaptable to various load conditions, that gives you peak performance on a wide variety of fuels—power that pays dividends!

Use International Diesels singly or in combinations of two or more. In multiples they cost less and deliver more power for the fuel consumed than a single oversize engine—and they provide the additional advantage of being separable for individual application to other power needs or for handling reduced loads.

Internationals start as easily as any gasoline engine of like horsepower. Internationals feature: • long-life, heat-treated replaceable cylinders with full length jackets • full-pressure lubrication of all working parts through drilled passages • Tocco-hardened crankshafts • heavy-duty precision bearings of replaceable type • oil pump with floating screen • by-pass type, thermostatically controlled cooling system • full-floating water pump shafts • full-floating piston pins • variable speed governors • large diameter flywheels • large capacity oil-bath type air cleaners • renewable element oil filters.

Each of these features is part and parcel of any International Power Unit—makes it what it is: the outstanding Diesel power for today's requirements. See the International Industrial Power Distributor or Dealer near you for additional information and assistance in selecting the size of power unit best adapted to your needs.

Industrial Power Division
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

INTERNATIONAL Industrial Power

Tough going takes tough precision parts

McQUAY-NORRIS PISTON RINGS

Wherever Diesel engines toil at their rugged work, tough McQuay-Norris parts are on the job. Leading builders of Diesel engines know that these parts, products of a company that has specialized in making precision parts since 1910, can always be depended upon for efficient, economical performance. Send us your blueprints.

ARMY E NAVY

Awarded to two plants McQuay-Norris Ord. Management Division

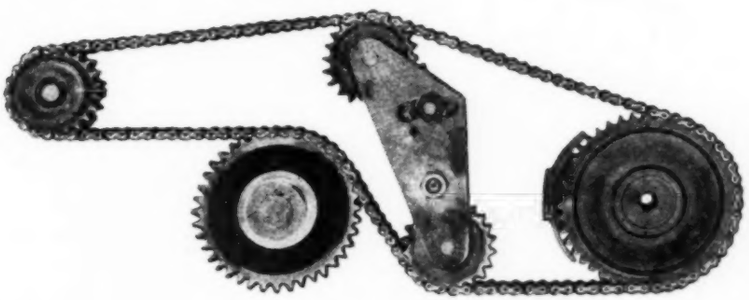
McQUAY-NORRIS

MANUFACTURING COMPANY

ST. LOUIS, MO.

PRECISION WORKERS IN IRON, STEEL, ALUMINUM, BRONZE, MAGNESIUM

TIMING DRIVES
for the "Brand New" TWIN COACH



Since bus performance depends largely on engine performance—design, construction, selection of all parts and accessories are of greatest importance.

Utmost dependability in timing is a number one essential—and it is noteworthy that for this Postwar Twin engine which bristles with important features, DIAMOND ⅜-in. pitch, 4-strand roller chain is employed.

Years of performance on millions of horsepower of gasoline and Diesel engines, have given DIAMOND Timing Drives top rank by leading engine designers. Recommendations by our engineering staff now may help you save time and improve the performance of your engines. DIAMOND CHAIN & MFG. CO., 407 Kentucky Avenue, Indianapolis 7, Indiana. Offices and Distributors in all Principal Cities.

Here it is—the pilot of the Twin Coach postwar line of 32 to 44-passenger city-type coaches. It is the first bus built by this company since 1942.

The new power plant designed for undercoor mounting. It is of the overhead valve design with the special combustion chamber and weighs 6 lb. per hp. It has 404 cu.in. displacement and develops 149 brake horsepower at 2800 r.p.m. Note easy accessibility of engine accessories.

THE NEW TWIN COACH

With the first showing of the pilot model of its postwar bus, Twin Coach announces a line of 32 to 44-passenger urban type coaches.

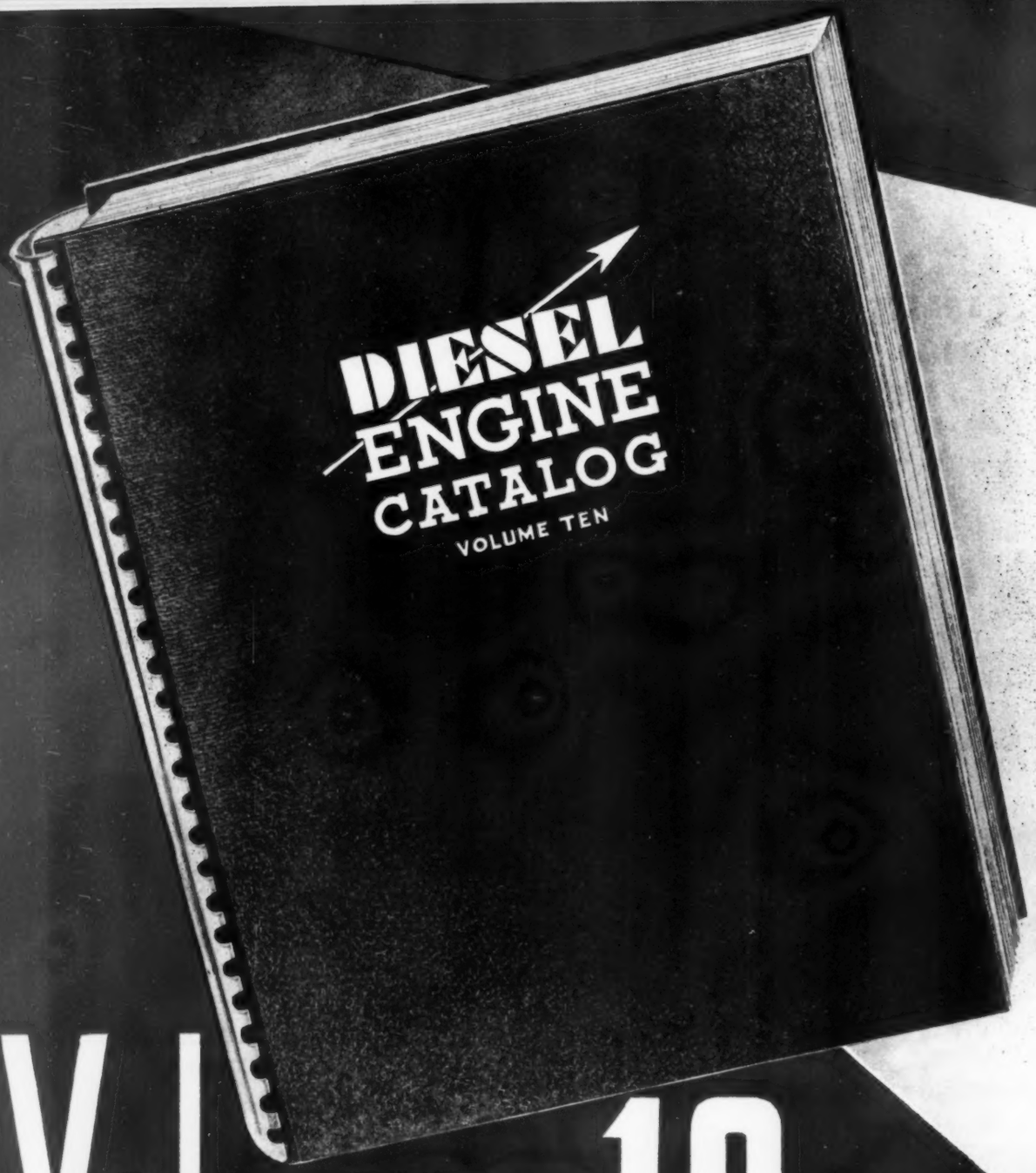
"TRANSPORTATION COMPANIES who buy high-grade motor coaches must be prepared to live with them for a decade. Therefore, ... uled to go on tour throughout the country.

The pilot model shown here is the first bus produced by Twin Coach since 1942. When this organization turned its plant over to the production of war material it scrapped all ... tures. Many of them such as the smart-looking body lines with fluted side panels, the new front end, the attractive doors and generous windows are readily apparent even to a casual glance. Other important but less obvious innovations include a new, more powerful engine—two of them on the larger vehicles—with ... converter trans- ... suspen-

DIAMOND **ROLLER CHAINS**

Excerpt from "Bus Transportation"

The timing chain has ⅜ in. pitch, 4 strand roller chain, 51 in. long. It has an overall width of 1 23/32 in. Crankshaft sprocket and two idler sprockets have 22 teeth, camshaft sprocket 44 teeth, accessory and drive sprocket 34 teeth. All unsupported sprockets are mounted on needle bearings. Chain adjustment is made by an eccentric plate holding the two idler sprockets which are accessible through an opening in the chain housing at front of engine. The design is such that there is less than ¼ deg. change in relation of crankshaft to camshaft through the entire range of chain adjustment.



Volume 10

...is the book you have been looking for—a book you need now and will use throughout the coming year. Not a book to read and lay aside—one to which you will frequently refer!—Design and operating engineers, Diesel students, purchasing and sales executives—in fact all who are interested in Diesel engines, accessories and plant equipment, keep The DIESEL ENGINE CATALOG within reach all the time — because it is the real "bible."—a big book—10⅛" x 13½"—920 pages, and a really big value.

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...sands buy the DIESEL ENGINE CATALOG each year—thousands more will want this tenth edition because they need it more than ever, and it is the only book of its kind published. Make sure you have up-to-the-minute information on all the new and vitally important Diesel developments—order your copy of the DIESEL ENGINE CATALOG, Volume 10.

NOW

Close-... shows

Elliott-... Freem...

STAN...

Elliott-... horsep... engine...

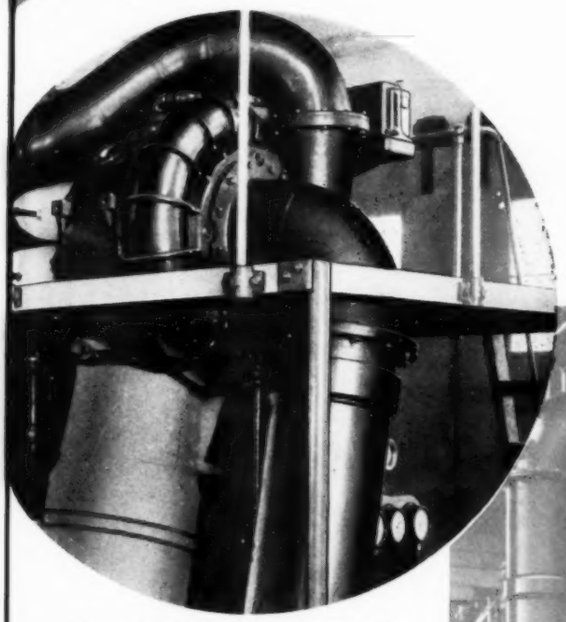
Raised... 55,000... daily!

Raised... additi... perma...

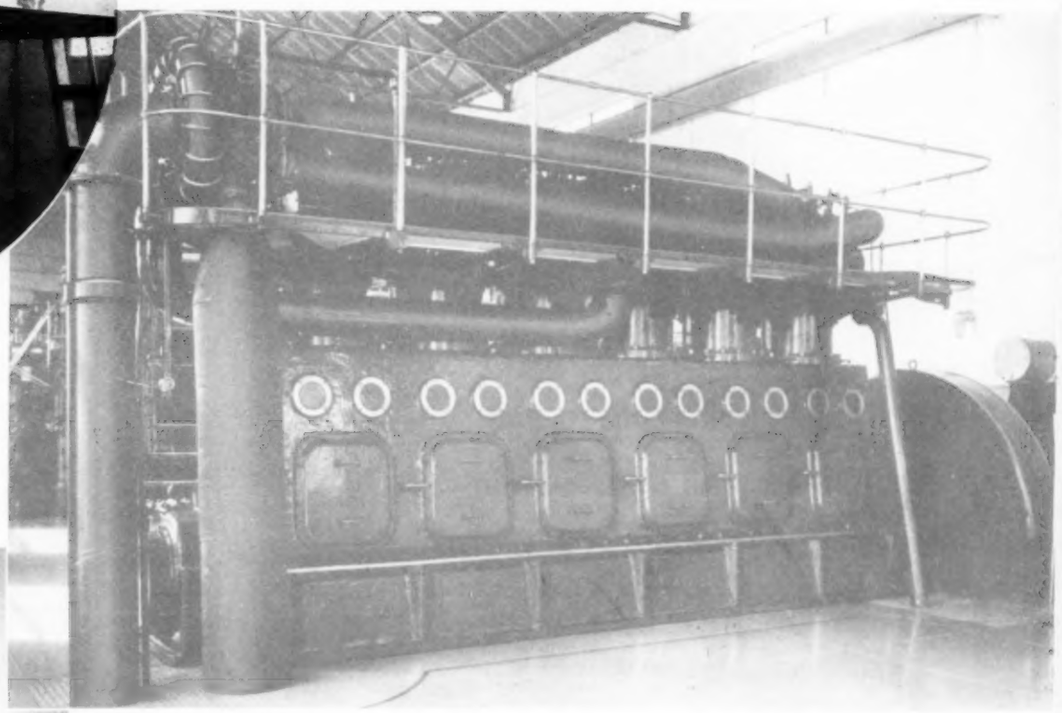
Origin... so suc... stalled... power...

Compl... raised... 750 I... throug... increa... 62 per...

Speedway TO GREATER PIPE LINE CAPACITY VIA ELLIOTT BUCHI TURBOCHARGERS



Close-up of turbocharger at Ormonde station shows installation detail.



Elliott-Buchi turbocharger applied to engine in Freeman, Mo., pumping station.

FACTS ABOUT THE STANOLIND INSTALLATIONS

Elliott-Buchi turbochargers increased horsepower of 15 to 20 year old Diesel engines!

•

Raised total pumping capacity from 14,000-55,000 barrels daily to 140,000-180,000 barrels daily!

•

Raised pumping capacity without tremendous additional overhead expense at a time when permanence of increased load was questionable!

•

Original installation of 12 Elliott turbochargers so successful that Stanolind Pipe Line Co. installed 20 more for further increase of horsepower in other pumping stations!

•

Completion of whole program has raised the line pressure from 550 to 750 lb. resulting in an increase in throughput of 18 per cent and an increase in power requirements of 62 per cent.

More crude—*faster*—was the cry. The Stanolind Pipe Line Company greatly increased pipe line capacity by stepping up the horsepower of existing Diesels in their pumping stations with Elliott-Buchi exhaust gas turbochargers. One typical station increased its capacity as much as 6000 to 9000 barrels daily.

The success of the installations is indicated by the fact that twenty more Elliott-Buchi turbochargers were added by this company so the crude oil could flow faster than ever.

Elliott-Buchi turbochargers team up beautifully with Diesels designed for their application. They will boost the power to an important extent on every existing 4-cycle engine which can be adapted to take advantage of them.

These units increase power up to 50% for a given engine size, due to efficient scavenging and pressure charging.

Available for engine ratings above 250 h.p.—marine, stationary, and locomotive.

Details covered in Bulletin M-5—yours on request.

ELLIOTT COMPANY

Supercharger Dept., JEANNETTE, PA.

Plants at: JEANNETTE, PA. • RIDGWAY, PA. • SPRINGFIELD, O. • NEWARK, N. J.

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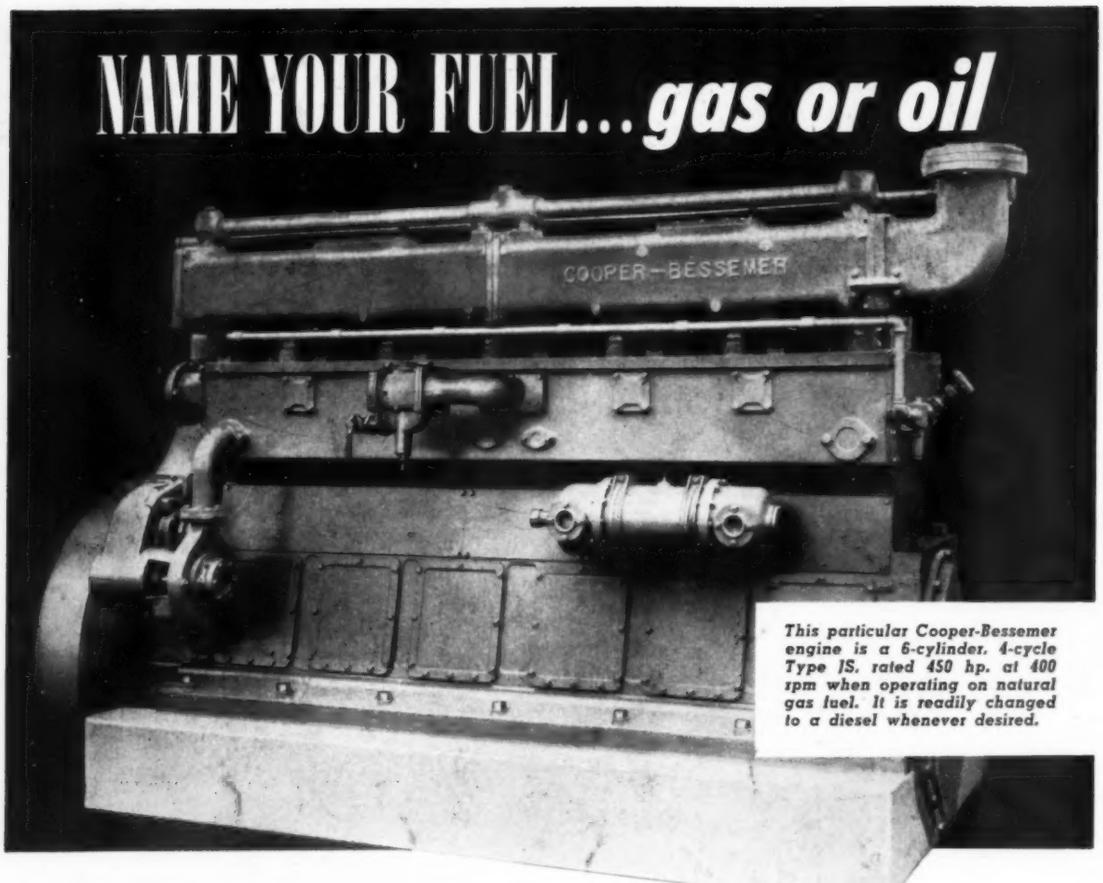
M-80A

NAME YOUR FUEL... *gas or oil*



This particular Cooper-Bessemer engine is a 6-cylinder, 4-cycle Type JS, rated 450 hp. at 400 rpm when operating on natural gas fuel. It is readily changed to a diesel whenever desired.

The engine shown here can be supplied for either natural gas or diesel operation—whichever is the most economical choice in your locality. It is one of six Cooper-Bessemer stationary types ranging from 95 to 2000 horsepower.

All are long-life heavy duty engines . . . all are available for highly efficient operation on either fuel . . . and, what's more, conversion from gas to diesel or diesel to gas is surprisingly simple and entirely practical—a feature that protects investment should a changeover ever become economically desirable.

Always dependable, requiring little attention or maintenance, Cooper-Bessemer engines are enabling mills and other process industries in all parts of the country to cut their operating power costs to the bone.

If you are looking forward to modernization of your power set-up . . . if your local fuel resources or other conditions make diesel or gas engines a "natural" . . . then by all means get the full Cooper-Bessemer story. The nearest Cooper-Bessemer office will welcome your inquiry — now.

THE Cooper-Bessemer CORPORATION
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BUILDERS OF FINE ENGINES FOR 112 YEARS